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ENVIRONMENTAL ASSESSMENT BOARD

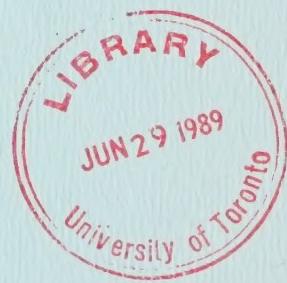
VOLUME: 115

DATE: Monday, June 19th, 1989

BEFORE: M.I. JEFFERY, Q.C., Chairman

E. MARTEL, Member

A. KOVEN, Member



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HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL
RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR
TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental
Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental
Assessment for Timber Management on Crown
Lands in Ontario;

- and -

IN THE MATTER of an Order-in-Council
(O.C. 2449/87) authorizing the
Environmental Assessment Board to
administer a funding program, in
connection with the environmental
assessment hearing with respect to the
Timber Management Class
Environmental Assessment, and to
distribute funds to qualified
participants.

Hearing held at the Ramada Prince Arthur
Hotel, 17 North Cumberland St., Thunder
Bay, Ontario, on Monday, June 19th,
1989, commencing at 1:00 p.m.

VOLUME 115

BEFORE:

MR. MICHAEL I. JEFFERY, Q.C.	Chairman
MR. ELIE MARTEL	Member
MRS. ANNE KOVEN	Member

(i)

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(ii)

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I N D E X O F E X H I B I T S

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669	Article entitled: Budworm: What About The Forest by Alan Gordon.	19287
670	Article entitled: Building New Spruce/Fir Stands, A Long-Term Localized Strategy for Reducing Spruce Budworm Impact authored by R.M. Frank, U.S. Forestry Service.	19294
671	Forests for Tomorrow Interrogatory Nos. 7, 9, 10, 14, 16, 17 and 21 (Panel 12).	19315
672	Book entitled: Forest Ecology by J.P. Kimmons, University of British Columbia, dated 1987.	19320
673	Article entitled: Strip Cutting as a Means of Protecting Site and Streamflow Quality when Clearcutting Northern Hardwoods by J.W. Hornbeck, G.E. Likens, R.S. Pierce and F.H. Bormann.	19346
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1 ---Upon commencing at 1:05 p.m.

2 THE CHAIRMAN: Good afternoon. Be
3 seated, please.

4 MS. MURPHY: Yes. Before we commence, I
5 understand Mr. Hynard had an undertaking that was left
6 over from the previous day that we wanted to comply
7 with at this time.

8 MR. HYNARD: This undertaking resulted
9 from cross-examination by Mr. Hanna, and Mr. Buss and I
10 had promised to determine the number of management
11 plans in the Thunder Bay District that contain
12 provisions for the protection of moose browse from the
13 application of herbicides in some areas of concern.

14 And there are three such management units
15 and they are the Black Sturgeon FMA, the Port Arthur
16 Crown Management Unit and the Bright Sands FMA. In the
17 case of the Bright Sands, the plan is not yet approved
18 and all three of them state this prescription in a
19 different fashion but all three of them contain it.

20 MR. CASTRILLI: Is there anything else?

21 THE CHAIRMAN: Thank you, Mr. Hynard.

22 Mr. Castrilli, I have to take a
23 conference call at three o'clock for probably 20
24 minutes or so. So I was going to suggest that we could
25 just continue on until close to then with your

1 examination and take a break at that time.

2 MR. CASTRILLI: That's fine with me, Mr.
3 Chairman.

4 THE CHAIRMAN: Thank you.

5 MR. CASTRILLI: Mr. Chairman, at the
6 commencement of this examination I would like to file a
7 number of interrogatories that we asked of members of
8 this panel for Panel 13.

9 I will give the Board the list of
10 interrogatories included and then I would ask that this
11 be made the next exhibit. These are all
12 interrogatories from Forests for Tomorrow and the
13 numbers are 16, 20, 22, 24, 25, 26, 28, 29, 31 and 39.

14 THE CHAIRMAN: That will be Exhibit 668.

15 MR. CASTRILLI: (handed)

16 THE CHAIRMAN: Thank you.

17 ---EXHIBIT NO. 668: Forests for Tomorrow Interrogatory
18 Nos. 16, 20, 22, 24, 25, 26, 28,
29, 31, 39 (Panel 13).

19 J. JOSEPH CHURCHER,
20 EDWARD ISKRA,
21 ROBERT L. GALLOWAY,
22 ROBERT A. CAMPBELL,
23 MICHAEL EDWIN BUSS,
24 PETER PHILLIP HYNARD,
25 CINDY STERN KRISHKA,
26 STEPHEN NICHOLSON, Resumed

27 CROSS-EXAMINATION BY MR. CASTRILLI:

28 Q. Mr. Churcher, I would like to begin

1 with you. And we will be referring initially to what
2 would be Exhibit 604A, page 84.

3 Now, I understand your evidence to be
4 that for the period 1977 to 1981 approximately
5 15-million cubic metres of wood were annually lost to
6 insects in Ontario's forests; is that correct?

7 MR. CHURCHER: A. Yes, that's correct.

8 Q. And if I could refer you to page 123
9 of the same exhibit, it is actually Table 5, Average
10 Annual Pest Caused Losses in Ontario's forests?

11 A. Yes, I have it.

12 Q. The column along the top marked total
13 and then down the right-hand side midway where it says:
14 Total insects, we see a figure 15.493-million

15 A. Yes.

16 Q. That was the 15-million that you
17 rounded off at page 84?

18 A. Yes, that's correct.

19 Q. Now, looking at the top column on the
20 same page, page 123, losses to spruce budworm?

21 A. Yes.

22 Q. We have a breakdown by tree species.
23 Can you confirm for me that balsam fir, which is listed
24 as the third tree species in that top portion of the
25 column, accounted for or was the subject of total

1 losses in excess of 10-million cubic metres on average
2 for that five-year period?

3 A. Yes, that's what it says.

4 Q. And that would be, just ballparking
5 it, roughly two thirds of the annual wood lost to the
6 budworm for that five-year period on average was balsam
7 fir?

8 A. Two thirds of the total insect figure
9 of 15-million hectares, yes.

10 Q. Thank you. And can you confirm for
11 me, continuing with that page, that the forest losses
12 to spruce budworm for the combined black and white
13 spruce tree species would be approximately 3.1-million
14 cubic metres per year and that would be the figures
15 1.469-million plus 1.690-million?

16 A. Yes, that's correct.

17 Q. Roughly 20 per cent of the total tree
18 species losses on average for that five-year period?

19 A. Yes, that would be correct.

20 Q. Can I now ask you to refer to page
21 131, same exhibit. We are looking at what would be
22 Table 3.2 on that page--

23 A. Yes.

24 Q. --which is entitled: Softwood Timber
25 Harvested on Provincial Crown Land. Looking at the

1 balsam fir column, would you confirm for me that
2 between the years 1977 to 1981 the annual harvest of
3 balsam fir was in the range of 400- to 900,000 cubic
4 metres?

5 A. Yes, that's the range over those five
6 years.

7 Q. And continuing with page 131, the
8 spruce column under Table 3.2, can you confirm for me
9 that between the years 1977 to 1981 between 6- and
10 8-million cubic metres per year of spruce were
11 harvested annually?

12 A. Yes, actually in 1980 it is almost
13 9-million cubic metres.

14 Q. Fine, I will take that answer.
15 Comparing the balsam fir to spruce, would you agree
16 that the major tree loss from spruce budworm is to tree
17 species that is harvested least?

18 A. When comparing the balsam fir cut to
19 the spruce cut, yes.

20 Q. Just ballparking it again, roughly 10
21 times more spruce was harvested annually than balsam
22 fir for that period?

23 A. Generally speaking, yes.

24 Q. Thank you.

25 A. As measured in volume cubic metres.

1 Q. Yes, thank you. Now, for the next
2 question I probably should ask if you have a copy of
3 Exhibit 56 handy, it is the FRO 1986?

4 A. No, I do not. I believe Mr. Hynard
5 has one which he is searching for at the moment.

6 Q. We are only going to be looking at
7 initially page 43. Mr. Churcher, you now have the
8 page?

9 A. Yes, I do.

10 Q. This is the table entitled: Area and
11 Gross Total Volume for the Provincial Production Forest
12 plus Forest Production Reserve by Working Group in
13 Age-Class as of 1985.

14 Can you confirm for me looking at the
15 total growing stock of spruce in Ontario that we are
16 looking at approximately -- or we are looking at in
17 excess of 2-billion cubic metres?

18 A. Yes, gross total volume is that
19 figure.

20 Q. And would you agree that the
21 estimated annual loss of spruce, which we were just
22 speaking of a moment ago, of approximately 3-million
23 cubic metres per year from insects constitutes one
24 fifteenth of one per cent of the total growing stock of
25 spruce?

1 A. I would have to check that
2 calculation.

3 Q. Roughly 3-million divided by
4 2-billion. You can do it at the break and confirm it
5 later if you like?

6 A. Yes, I will.

7 Q. And accepting for the moment subject
8 to verification that percentage figure of .15 per cent,
9 would you agree that compared to the total growing
10 stock of spruce; that is, 2-billion cubic metres, that
11 the estimated loss of 3-million cubic metres per year
12 to budworm is relatively small?

13 A. Yes, the figure of 3-million compared
14 to 2-billion would be reasonably small in comparison.

15 Q. Considering that the major loss is to
16 balsam fir, at least for the period '77 to '81, and
17 that balsam fir is only a small part of the total
18 volume of wood harvested, would you agree that it may
19 not have been necessary to spray in certain
20 circumstances for that period?

21 A. No, I wouldn't necessarily agree with
22 that.

23 Q. Just looking at it at the global
24 level, the figures we have been comparing, leaving
25 aside differentiation between management units.

1 A. Just looking strictly at the figures
2 as we have discussed them, then it is not unreasonable
3 that someone might draw that conclusion, yes.

4 THE CHAIRMAN: Can you draw any
5 conclusion as to what the figures would be if you had
6 not sprayed?

7 MR. CHURCHER: The loss figures?

8 THE CHAIRMAN: (nodding affirmatively)

9 MR. CHURCHER: I would not imagine that
10 the figures -- the loss figures would be that much
11 larger, taking into account that the area that we spray
12 on any given year usually isn't any more than one to
13 two per cent of the infestation. By and large the
14 infestation has progressed unabated without any
15 intervention or involvement by man.

16 MR. CASTRILLI: Q. And, Mr. Churcher,
17 just to confirm for me on the record, page 30 of
18 Exhibit 56, Figure 14: Growing Stock by Working Group
19 for Ontario, the column for spruce, this is meant to
20 graphically, by way of bar chart, illustrate the same
21 numbers; is that right?

22 MR. CHURCHER: A. Yes, it is -- the
23 vertical column is rather unclear as to what those
24 numbers indicate. I would assume that they are in
25 billions of cubic metres.

1 Q. Yes.

2 A. And if they are, then yes, it
3 geographically depicts what was in the table.

4 Q. Thank you. I understand from your
5 testimony, Mr. Churcher, that the spruce budworm is a
6 natural component of the spruce forest throughout
7 northeastern North America; is that correct?

8 A. That's correct.

9 Q. And I understand as a part of the
10 Ministry of Natural Resources spruce budworm management
11 strategy that district offices of the Ministry should
12 rate the vulnerability of forests to damage by spruce
13 budworm?

14 A. Yes, that's one component of the
15 strategy.

16 Q. Can you confirm for me that stands
17 rated as vulnerable, if they were not treated, could be
18 allowed to be defoliated by the budworm in order to
19 allow the spruce trees to occupy more of the stand?

20 A. I'm sorry, could you repeat that
21 question, please?

22 Q. Yes. Can you confirm for me that
23 stands rated as vulnerable, if they were not
24 treated, could be allowed to be defoliated by the
25 budworm in order to allow the spruce trees to occupy

1 more of the stand?

2 A. I guess that would depend on the
3 stand in question and how vulnerable it was and why it
4 was rated as vulnerable. Vulnerability rating takes
5 into account not only the species -- the tree species
6 that exists but also the age of each species, stand
7 composition, the density, things like that.

8 Q. As a general proposition, would you
9 accept the proposal that I just made?

10 A. I guess I find it difficult to think
11 of it in general terms. I tend to view it in a more
12 specific stand-by-stand case. It is possible that the
13 effect you suggested could occur.

14 MR. HYNARD: A. Perhaps I could help you
15 there, Mr. Castrilli.

16 Q. Well, let's hold on a minute, Mr.
17 Hynard.

18 Mr. Churcher, could I ask you to turn to
19 page 136. We are looking at Item B, the top of that
20 page, beginning with the second sentence:

21 "If an area cannot be converted to a less
22 vulnerable species, allowing nature to
23 run its course may be the preferable
24 option. This will allow the budworm to
25 cause high mortality to the balsam fir

1 overstorey and understorey and thus
2 favour the less vulnerable spruce in the
3 future forest."

4 Isn't that essentially the proposition I
5 just put to you?

6 MR. CHURCHER: A. Yes, in very general
7 terms it is.

8 Q. So do you agree with that
9 proposition?

10 A. Yes, as stated there, noting that the
11 paragraph continues to say that:

12 "The future forest (i.e., the one that is
13 regenerated to spruce) will still be
14 susceptible but possibly less
15 vulnerable."

16 So it will still have some degree of
17 vulnerability there.

18 Q. But less than the balsam fir which
19 preceded it; is that correct?

20 A. Assuming that the major component in
21 the original stand is balsam fir then, yes, it would be
22 less vulnerable.

23 Q. Thank you. And would it be
24 reasonable to infer from that, if we had a
25 predominantly balsam fir stand and it were left to the

1 budworm, that the Ministry should expect to get more
2 spruce as a result?

3 A. If the budworm were the only factor
4 in the forest that was driving the succession or what
5 the next stand would be, then that is a possibility,
6 yes.

7 Q. Thank you. Generally the Ministry's
8 planting programs consist of both jack pine and spruce;
9 is that right?

10 A. That is my understanding.

11 Q. Fine. But coming back to the
12 proposition that's outlined at page 136, you would
13 agree that letting nature run its course is an option
14 in dealing with budworm; is that correct?

15 A. Yes, definitely.

16 Q. Would you also agree that the budworm
17 is an essential factor in maintaining spruce in a stand
18 through time?

19 A. I think that, as we have noted
20 before, that the fact that spruce budworm is a natural
21 component of the forest and that there have been
22 successive outbreaks, as long as records show; also
23 given the fact that balsam fir and spruce continue to
24 be a part of the forest, would indicate that there is a
25 equilibrium between the trees species and the insect

1 pests that attack them.

2 Q. So the answer -- sorry.

3 A. In other words, the pest is not going
4 to do away or eliminate or eradicate its host species.

5 Q. So the answer to my question is yes?
6 Would you like me to repeat it?

7 A. Yes, that would probably be best.

8 Q. Thank you. Would you agree that the
9 spruce budworm is an essential factor in maintaining
10 spruce in a stand through time?

11 A. I guess I would take exception to the
12 word essential. The way I understand the question, it
13 sounds like without the spruce budworm there would be
14 no spruce.

15 Q. Let me rearrange the sentence and see
16 if we can get some common ground here. Would you agree
17 that spruce budworm is an important factor in
18 maintaining spruce in a stand through time?

19 A. I believe that the spruce would
20 probably persist in the stand to a greater or lesser
21 degree whether the budworm was there or not, but again
22 I feel that there is an equilibrium, if you will,
23 between the spruce component, fir component and
24 budworm. Each has a role in the forest eco-system and
25 that is proven by the fact that we still have all

1 three.

2 Q. We are not quite getting an answer to
3 the question.

4 A. Perhaps I am just not understanding
5 the question.

6 Q. Well, let me ask it again. It may
7 improve with three asking. Would you agree that the
8 spruce budworm is an important factor in maintaining
9 spruce in a stand through time?

10 Give me a yes or no and then, if you want
11 to qualify it do so, but I would like a response to the
12 question as asked?

13 A. Yes, in a general sense it is an
14 important factor.

15 Q. Okay. Are you familiar with an
16 article by Alan Gordon,

17 A. Yes, I am. Well, Alan Gordon has
18 written a number of articles --

19 Q. Let me finish the sentence with, that
20 I provided to you on Friday?

21 A. Yes and I was familiar with that
22 article prior to you providing it.

23 Q. Well, I think you only get one yes in
24 any event. And that article is entitled: Budworm!
25 What About The forest?

1 A. Yes, that's correct

2 MR. CASTRILLI: Mr. Chairman, I would ask
3 this be made the next exhibit.

4 THE CHAIRMAN: Exhibit 669.

5 MR. CASTRILLI: (handed)

6 THE CHAIRMAN: Thank you.

7 ---EXHIBIT NO. 669: Article entitled: Budworm! What
8 About The Forest by Alan Gordon.

9 MR. CASTRILLI: Q. Mr. Churcher, you
10 have a copy of that; right?

11 MR. CHURCHER: A. Yes, I do.

12 Q. Mr. Churcher, at the time of writing
13 of this article, I understand Mr. Gordon was a research
14 scientist for the Ministry of Natural Resources at
15 Sault Ste. Marie. Is that your understanding?

16 A. That's correct.

17 Q. I would like to refer you initially
18 to page 22. I am really looking at both the text and
19 figure on that page, being the figure 36 which Mr.
20 Gordon outlines as being a white spruce/fir stand
21 structure following a budworm attack in 1979.

22 Mr. Churcher, we are in particular going
23 to focus on Mr. Gordon's discussion of that figure and
24 you will see actually it will be the right-hand column
25 on page 22.

1 A. Yes, I have it.

2 Q. Perhaps you might want to take a
3 moment to read the second full paragraph on the
4 right-hand column, the third paragraph on the
5 right-hand column and over on to page 23 the first full
6 paragraph on the left-hand column, and let me know when
7 you have completed that?

8 A. Yes, I have completed.

9 Q. Fine, thank you. Just turning
10 initially to page 23, the sentence that begins:

11 "If the present overstorey including the
12 rising secondary stand wave were now
13 wiped out, the stand would have a much
14 more favourable composition of
15 spruce relative to fir."

16 Do you agree with that assessment?

17 A. Given the figures that he provides,
18 yes.

19 Q. I now ask you to turn to page 25 and
20 we are looking at the bottom of that page, the
21 paragraph beginning:

22 "In both the foregoing cases..."

23 And on to the completion of the article
24 on page 26. And the reference "in both the foregoing
25 cases", is to the white spruce/fir and red spruce/fir

1 discussion that has been the source of the entire
2 article and he says:

3 "In both the foregoing cases the white
4 spruce/fir and the red spruce/fir, a
5 secondary budworm event has been
6 substantially responsible for the
7 maintenance of the spruce in the forest."

8 And then he then -- I should say, Mr. Gordon refers to:

9 "Similar interpretations can be...deduced
10 from work that has gone on in Maine."

11 And turning over to page 26, he says:

12 "I would propose that there are strong
13 arguments for the co-evolution of the
14 spruce budworm and the spruce/fir forest
15 and that where spruce and fir grow
16 together, budworm are an essential factor
17 in maintaining spruce in these stands
18 through time."

19 Do you agree, Mr. Churcher?

20 MR. CHURCHER: A. In a general sense,
21 yes, I agree. However, I think when one looks at a
22 concluding sentence to a paper like this, you have to
23 look back at the manner in which the study was done.

24 He is making these comments on two cases,
25 as you pointed out a white spruce/fir stand -- one

1 white spruce/fir stand, I believe he describes it in
2 the Algoma District of northcentral Ontario, and the
3 other case he talks about is red spruce/fir which was
4 located I believe in Algonquin Park. It's the only
5 stand of red spruce/fir That I am aware of in the
6 Province of Ontario.

7 So, essentially, the only case and the
8 one he keyed in on was the white spruce/fir. He
9 appears to be trying to draw general conclusions from a
10 study that was on one stand in one portion of Ontario
11 and I would be a little concerned about making general
12 wide-spread conclusions based on such a small sample
13 size.

14 Q. I'm just wondering, do we have
15 anything from the Ministry on the record comparable to
16 this?

17 A. To this kind of study?

18 Q. Yes.

19 A. Not that I am aware of. It's, I
20 believe, the only one that I know of.

21 Q. Mr. Gordon's study is the only one
22 you know of in Ontario?

23 A. The only one that comes to mind at
24 this time anyway.

25 Q. That's fine, thank you. In essence

1 though, Mr. Gordon, based on the work he has done, is
2 saying that the budworm is necessary to maintain the
3 spruce component of stands that are not cut; is that
4 right?

5 A. That is what he's saying, yes.

6 Q. And he's also suggesting that nature
7 can take care of things itself; is that right?

8 A. Yes, that would be a reasonable
9 interpretation of his conclusion.

10 Q. And do you agree with either or both
11 of those, generally?

12 A. Generally speaking, yes, I would
13 probably agree with both of those statements.

14 Q. Thank you.

15 A. One other thing I might add, if I
16 may, is that Dr. Gordon was one of the 20 invited
17 participants at the spruce budworm management workshop
18 that we held in Thunder Bay, as I believe I talked
19 about in my direct evidence, and that Fraser, that
20 paragraph that you cited on page 136 of...

21 Q. Exhibit 604?

22 A. Yes. Is to a certain extent an
23 interpretation or rewording of some of the views that
24 Dr. Gordon expressed at that workshop.

25 Q. So it's fair to say that Dr. Gordon

1 has had some influence on what I gather constitutes the
2 current Ministry policy on this issue?

3 A. Yes, definitely.

4 Q. Fine. Now, Mr. Churcher, I also
5 understand your evidence to be that if vulnerable
6 stands cannot be converted to a lower vulnerability,
7 one should be prepared to manage them on a shorter
8 rotation; is that correct?

9 A. Yes, that's correct.

10 Q. And would I be correct in concluding
11 from that general proposition that MNR, in certain
12 instances, is recommending lowering the rotation age?

13 A. Well, the strategy suggests that that
14 might be a consideration that the forester may want to
15 take into account when he's developing the timber
16 management plan for the next five years, when he is
17 dealing with highly vulnerable stands or stands that
18 are highly vulnerable to the spruce budworm.

19 Q. And that is one component of a series
20 of components that MNR currently employs to deal with
21 budworm; is that right?

22 A. Yes, that's correct.

23 Q. Does part of the MNR strategy include
24 the alternative of using certain types of silvicultural
25 methods such as modified cuts to accomplish the same

1 end?

2 A. Yes, I believe so, to my knowledge.

3 Q. To what extent in Ontario or, more
4 specifically, in the area of the undertaking, has that
5 been employed to your knowledge?

6 A. I don't have any figures that I can
7 provide, although I believe there was in response to
8 one of the interrogatories from Forests for Tomorrow
9 for Panel 13 there were some relative scale was
10 provided for a similar question.

11 Q. Are you familiar with the work of
12 R.M. Frank from the U.S. Forest Service?

13 A. Not intimately, no.

14 Q. But you have been provided with a
15 copy of his article; is that correct?

16 A. Yes, I was.

17 Q. And that article is entitled:
18 Building New Spruce/Fir Stands, A Long-Term Localized
19 Strategy for Reducing Spruce Budworm Impact?

20 A. Yes, that's correct.

21 MR. CASTRILLI: Mr. Chairman, I ask that
22 this be made the next exhibit.

23 THE CHAIRMAN: Exhibit 670.

24 MR. CASTRILLI (handed)

25 THE CHAIRMAN: Thank you.

1

5 MR. CASTRILLI: Mr. Chairman, despite
6 this article's brevity, I'm informed this is all of it.

7 Q. Mr. Churcher, Mr. Frank -- or Dr.
8 Frank in his experiments found that shelterwood cutting
9 increased the amount of spruce in the stands and may
0 decrease the susceptibility of the stands to spruce
1 budworm, referring to page 365 of what is now Exhibit
2 670.

13 Has that been the Ministry's experience
14 as well in Ontario or, more specifically, in the area
15 of the undertaking?

16 MR. CHURCER: A. I believe the paper is
17 in reference to red spruce. Mr. Castrilli.

18 Q. I recognize that. What has been the
19 Ministry of Natural Resources experience in Ontario,
20 more specifically in the area of the undertaking, with
21 shelterwood cutting? Do we have anything on the record
22 from the Ministry on this?

23 MR. HYNARD: A. Could you repeat it
24 again, please. Mr. Castrilli?

25 Q. Well, let me ask Mr. Churcher first.

1 since he was raising his hand, eagerly seeking to
2 answer the question.

3 MR. CHURCHER: A. No, I was intending to
4 defer to Mr. Hynard.

5 Q. Pointing to Mr. Hynard. Mr. Hynard,
6 what were you going to say?

7 MR. HYNARD: A. I was just asking if you
8 could repeat the question so I have it straight with
9 respect to the Ministry and its use of shelterwood for
10 regeneration of spruce.

11 Q. The question I asked was: Frank
12 found that shelterwood cutting, albeit on red spruce,
13 increased the amount of spruce in the stands and may
14 decrease the susceptibility of the stands to spruce
15 budworm.

16 And my question was: What has been --
17 has that been experience of the Ministry of Natural
18 Resources in the area of the undertaking with respect
19 to black spruce or white spruce?

20 A. With respect to black spruce, no,
21 that is not the experience of the Ministry. There were
22 studies done, and I would have to undertake to find out
23 the location of those, with respect to black spruce and
24 that was definitely not the result. With regard to
25 white spruce, I'm not aware of such studies.

1 Q. Having been done in Ontario or the
2 area of the undertaking?

3 A. I'm not aware offhand of such
4 studies, no.

5 Q. So your undertaking is to provide me
6 with the studies on...?

7 A. Black spruce.

8 Q. Black spruce?

9 A. Yes.

10 Q. Okay. I have put a giant U on my
11 page and you will be hearing from me further no doubt.

12 Apparently, I guess I can ask either Mr.
13 Churcher or Mr. Hynard. Is shelterwood cutting
14 feasible in the area of the undertaking with respect to
15 budworm control?

16 MR. CHURCHER: A. Again, I think I would
17 have to defer to Mr. Hynard.

18 MR HYNARD: A. Well, is shelterwood
19 cutting feasible with regard to black spruce and white
20 spruce or balsam fir? I would have to separate that
21 into three parts really.

22 Q. If you want to give me a three-part
23 answer, I'm content to have a three-part answer.

24 A. With respect to balsam fir, I would
25 think that it would be quite easy to obtain natural

1 regeneration using shelterwood cutting under a variety
2 of site conditions for the reason that balsam fir
3 readily produces advance reproduction and that the
4 removal of the overstorey in two or more cuts would
5 favour the development of that balsam fir over any
6 associated hardwoods, at least any associated
7 intolerant hardwoods.

8 So I would think that it would be
9 possible, although I would expect that there would be
10 losses -- considerable losses in the residual stand due
11 to windthrow. Balsam fir is not a very windfirm
12 species.

13 With respect to black spruce, there was
14 considerable evidence given in Panel 10 on the
15 applicability of shelterwood to black spruce. Black
16 spruce is tolerant enough of shade but it is not
17 windfirm enough on most of its sites, at least on those
18 sites where natural regeneration of black spruce is
19 feasible, it's not windfirm enough to make that a
20 practical proposition.

21 With regard to white spruce, I'm already
22 undertaking to find out -- sorry, that is the black
23 spruce one.

24 With regard to white spruce, how feasible
25 it would be would be very, very site-specific. It

1 would depend on the nature of the site and the stand to
2 know whether it were possible at all to regenerate
3 white spruce using the uniform shelterwood system.
4 Again windfirmness is a problem.

5 Q. And your recollection is that you are
6 not familiar with any studies in Ontario?

7 A. I cannot think offhand of a study in
8 Ontario where that was done with white spruce.

9 Q. Now, as I recall you are a Great
10 Lakes/St. Lawrence forester; is that right?

11 A. That's right.

12 Q. Do the boreal foresters on the panel
13 agree with you?

14 A. Mr. Galloway?

15 MR. GALLOWAY: A. Yes, quite loudly I
16 may say. I'm not aware of a study on white spruce on
17 the modified cutting similar to Peter's answer.

18 Q. Let's leave it then, Mr. Hynard, that
19 you will provide an undertaking to obtain whatever
20 studies with respect to black spruce and shelterwood
21 cutting and budworm control you are aware of?

22 MR. HYNARD: A. Black spruce and
23 shelterwood cutting, there was no -- my recollection of
24 those studies, there was nothing to do with budworm
25 control as a part of those studies.

1 Q. Okay, fine. Whatever you were
2 referring to that you can find--

3 A. Yes.

4 Q. --you will provide. Thank you.

5 Mr. Hynard, since we are on you at the
6 moment, I gather from your comments, at least with
7 respect to balsam fir, that shelterwood cutting could
8 be an integral part of an integrated pest management
9 strategy?

10 A. No, no.

11 Q. No?

12 A. My answer was with respect to its --
13 the feasibility of using the shelterwood system in the
14 regeneration of balsam fir.

15 Q. So you were not making a comment
16 about budworm?

17 A. No, not at all.

18 Q. That's funny, I thought the question
19 was about budworm.

20 A. Well, it was a three-part question,
21 as I recall.

22 Q. Only with respect to the trees. So
23 your answer to that question is no?

24 A. The answer to that question was that
25 it is feasible to regenerate balsam fir using - at

1 least that is my guess - using the uniform shelterwood
2 system.

3 Whether that would be useful in a budworm
4 strategy or budworm control, Mr. Churcher would be in a
5 better position to answer if he felt the regeneration
6 of balsam fir would be useful in such a study.

7 MR. CHURCHER: A. In actual fact, I
8 would say that the regeneration -- or in citing the
9 regeneration of balsam fir would be the exact opposite
10 effect of what you are trying to get.

11 Q. Fine. Let's talk about block cutting
12 for a moment. Does the Ministry use block cutting or
13 apply block cutting to areas prone to budworm attack?

14 MR HYNARD: A. The evidence from Panel
15 10 on block cutting said that it was used -- are you
16 including strip cutting in that category block cutting?

17 Q. Yes, fine.

18 A. It's used in the regeneration of
19 black spruce on lowland sites and on shallow upland
20 sites. I don't -- my understanding of that situation
21 is that it is not an especially budworm susceptible
22 situation.

23 Q. Do we have anything on the record
24 with respect to block cutting and budworm attack from
25 this panel?

1 MR. CHURCHER: A. Not from this panel,
2 no.

3 Q. Or if you recall, Mr. Hynard, since I
4 gather you have been a witness now for some months,
5 going back to Panel 10?

6 MR. HYNARD: A. There was no connection
7 with budworm.

8 Q. All right, thank you. Now, in
9 response to an interrogatory that was asked of you by
10 the OFIA in what is now Exhibit 656. I think this is
11 still you, Mr. Churcher, by the way.

12 MR. CHURCHER: A. Which interrogatory
13 was this?

14 Q. Exhibit 656, it's Interrogatory 5
15 from the OFIA on Panel 13.

16 A. Yes, I have it.

17 Q. If this exhibit had pagination, we
18 would be looking at page 3. It's the gross area of
19 moderate to severe defoliation in hectares.

20 A. Yes, for spruce budworm in Ontario?

21 Q. Right.

22 A. Yes.

23 Q. For the period 1967 to 1988.

24 A. Right.

25 Q. Now, this is a chart that you

1 prepared; is that correct?

2 A. It's a chart which I provided.

3 Actually it was prepared by members of Forestry Canada,
4 the Forest Insect and Disease Survey Unit.

5 Q. I see. And it's a chart on the area
6 of moderate to severe defoliation in hectares by the
7 spruce budworm for three Ministry of Natural Resources
8 regions, and it's the total in the far right-hand
9 corner in each case; is that right?

10 A. That's correct. Although you are
11 indication is that it was three MNR regions bears a
12 little bit of explanation.

13 The Ministry reorganized into what we
14 currently think of eight administrative regions in I
15 believe the early 70s. Because this data goes back to
16 1967, it was formulated -- beginning in 1967 into three
17 geographic distinctions which they have titled southern
18 Ontario, which is essentially equivalent to the four
19 southern MNR regions that we know now; northeastern
20 Ontario, which is essentially a line from Lake Nipigon
21 east to the Quebec border, so that takes into account
22 all of northeastern region, all of the northern region,
23 parts of what is now the northcentral region; and the
24 last or the third area that they looked at was
25 northwestern Ontario which is the remainder, Lake

1 Nipigon west to the Manitoba border which is all of the
2 current northwestern region and the remainder of the
3 northcentral region.

4 Q. Can we take it that in any event the
5 total numbers on the right-hand side of the page
6 include all of Ontario?

7 A. That is correct.

8 Q. All right. And I would presume this
9 applies to white spruce, black spruce, balsam fir; is
10 that right?

11 A. Yes, that's correct.

12 Q. Now, I notice that the defoliation,
13 Mr. Churcher, ranged as low as 79,000 plus hectares in
14 1967 to as high as 18-million plus hectares in the
15 period 1979, 1980 and 1981; is that right?

16 A. That is also correct.

17 Q. Can I ask you to turn with me again
18 to Exhibit 56, it's the FRO 1986. We are again looking
19 at page 43, and we are looking again at the column
20 marked spruce--

21 A. Yes.

22 Q. --which is almost dead centre in the
23 page, and the column for balsam fir. Firstly, the
24 column for spruce, look at the right-hand side of the
25 page, the total area for spruce, white and black, is

1 15-million plus hectares; is that correct?

2 A. That's correct.

3 Q. And for balsam fir just below it we
4 are looking at 2-million plus hectares; is that right?

5 A. That's also correct.

6 Q. And if we accept subject to
7 verification that the combined figures for balsam fir
8 and spruce come to 17,934,309 hectares. Will you
9 accept that subject to verification?

10 A. Yes, I will accept that now doing a
11 quick addition.

12 Q. All right, thank you. Now, looking
13 again at Exhibit 656, the page we were just looking at
14 for the years 1979, 1980 and 1981, it would appear at
15 first blush that the budworm defoliated each year for
16 three years an area greater than exists for balsam fir
17 and spruce combined. Do you agree?

18 A. The figures that are given in that
19 table that we just discussed in the interrogatory, yes,
20 are 18-million hectares in 1980, or almost 19-million
21 hectares as a matter of fact, and that is more than the
22 17 million, 9 hundred odd thousand hectares that were
23 discussed in Forest Resources Ontario.

24 I would suggest it's probably a
25 difference in the way that these numbers were derived

1 and the way they were measured.

2 The area of moderate to severe
3 defoliation is derived from an aerial mapping exercise.
4 As the forest insect and disease survey rangers fly
5 over an area they map in a rather broad approach the
6 area that they note has been moderately or severely
7 defoliated.

8 After the maps have been all put together
9 across Ontario, then an area figure is derived from
10 those maps and it may include small lakes and rivers
11 and poplar stands and other areas that obviously would
12 not be defoliated by spruce budworm. However, the
13 scale on the map does not allow to differentiate
14 individual stands.

15 As noted in my direct evidence and as
16 pointed out by Mr. Martel in a question that he asked
17 on Figure 5 I believe of my evidence, and in Exhibit
18 604 - I don't recall the page number - it indicated
19 that the northcentral region there was roughly
20 5.3-million hectares of moderate to severe defoliation
21 mapped but in actual fact there was only 500,000
22 hectares or roughly one tenth of that were stands that
23 were eligible for some form of treatment to manage the
24 spruce budworm?

25 And Mr. Martel's question was: Why is

1 there a discrepancy. And the answer I gave to him then
2 is essentially the same explanation I am giving now, a
3 broad brush mapping on a very large scale map.

4 Q. So it would be fair to say, Mr.
5 Churcher, that the numbers in Exhibit 656 on this page
6 are inflated, at least for those three years? Or let
7 me put it this way: There should be some subtractions
8 that in fact have not been made on that page; is that
9 right?

10 A. If you wanted to get specifically the
11 number of hectares where only spruce and/or fir existed
12 that suffered moderate to severe defoliation then, yes,
13 these numbers are overestimates.

14 Q. You would want to subtract rivers and
15 small lakes and things like that?

16 A. Yes, that's correct, to get an
17 accurate number. However, for relative purposes these
18 numbers are very useful.

19 Q. You would agree for accuracy sake
20 there should be some subtraction; is that correct?

21 A. Yes, that's correct.

22 Q. Mr. Churcher, we, Forests for
23 Tomorrow asked you further interrogatories. In
24 particular we asked you one that is now Exhibit 632 --
25 excuse me, we didn't, OFIA did -- sorry, my apologies,

1 it is us.

2 It is Exhibit 632, it has more than one
3 interrogatory on it. It's Question 21 in what is now
4 Exhibit 632.

5 A. Yes.

6 Q. It would be the last -- four pages
7 from the end of that exhibit.

8 A. Yes, I have it.

9 Q. We asked you a three-part question on
10 the top of the page: What was the cost of the aerial
11 spraying program in northcentral region for 1987 and
12 the estimated value of the timber by species that was
13 actually saved.

14 Secondly, we asked you how much of the
15 area sprayed in 1987 has been harvested. And, thirdly,
16 we asked you how much of it is planned for harvest in
17 the next ten years.

18 Beginning with your answer under (a) you
19 noted that approximately -- well, exactly 76,526
20 hectares were aerially treated for spruce budworm in
21 that region for that year; is that right?

22 A. That's correct.

23 Q. Now, I gather this was an area under
24 heavy budworm attack; is that right?

25 A. Yes, it had been attacked severely

1 for a number of years.

2 Q. And I gather this was a commercially
3 operable forest?

4 A. Parts of it were a commercially
5 operable forest, yes. There were some other values
6 that were protected in that program as well.

7 Q. I gather at least 76,526 hectares of
8 it were commercially operable; weren't they?

9 A. No, that figure was for the entire
10 spray program in the northcentral region in 1987.

11 Q. Now, we asked you in Item (b): How
12 much of the area sprayed in 1987 has been harvested.
13 And your answer was, on the next page, 558 hectares of
14 the commercially operable forests treated in 1987.

15 I presume the 558 hectares were cut in
16 1988, or do you know?

17 A. I believe they were. I am trying to
18 recall the format the information came in from the
19 districts. I can confirm that for you after the break
20 if you would like.

21 MS. MURPHY: It would have to be '87 or
22 '88.

23 MR. CASTRILLI: That's right.

24 MS. MURPHY: Does it matter?

25 MR. CASTRILLI: Well, it may not.

1 MR. CHURCHER: Right, We are not into
2 summer 1989 yet, of course.

3 MR. CASTRILLI: Q. Now, we asked you in
4 Item (c) how much of the area sprayed is planned for
5 harvest in the next ten years. And your answer was
6 that the remainder of the commercially operable forest
7 that were treated in 1987 will be harvested in the next
8 ten years.

9 Now, I took your answer in (a) which you
10 said 76,500 plus hectares to be the total area that you
11 planned on harvesting. Is that an inaccurate
12 assumption on my part?

13 MR. CHURCHER: A. Yes, it was.

14 Q. How much were you planning on
15 harvesting?

16 A. I can't recall right now what the
17 total area of commercially operable forest was or what
18 component of that 76 thousand some odd hectares was
19 classed as commercially operable forest.

20 Q. That was the purpose of the question
21 in the interrogatory. Could I ask you to undertake to
22 find that out?

23 A. Yes, I will try. I apologize for
24 misinterpreting your question.

25 Q. That's quite all right. We will

1 probably come back to that later.

2 A. It will probably end up having to get
3 in touch with each of the four or five districts that
4 were involved in that program. It may take a day or
5 two before they respond and I can pull those numbers
6 together.

7 Q. That's fine. Have you generally
8 provided any evidence before this Board that all areas
9 sprayed for insects have in fact been harvested where
10 the forests were commercially operable?

11 A. I'm sorry, could you repeat that?

12 Q. Have you provided any evidence before
13 this Board that all areas sprayed for insects have in
14 fact been harvested where the areas were commercially
15 operable?

16 A. It is noted in the procedure for
17 aerial application of insecticides for forest
18 management, that is one of the criteria for spraying a
19 commercially operable forest, it will not be sprayed
20 unless it is going to be harvested within ten years.

21 I believe your question is: Have we
22 provided anything that proves we do this one way or
23 another and my response is no, not that I am aware of.

24 Q. That's fine. I will wait until you
25 have provided an answer on Interrogatory 21 to pursue

1 this further.

2 A. Very well.

3 Q. Now, in what is Exhibit 668, Question
4 31. 668 is our list of interrogatories for Panel 13.
5 We asked a five-part question relating to a 1987
6 planned spray operation to protect jack pine stands in
7 the Dryden Crown Management Unit.

8 Mr. Iskra, were you the author of the
9 answer?

10 MS. CRONK: Sorry, what number?

11 MR. CASTRILLI: The interrogatory?

12 MS. CRONK: Yes.

13 MR. CASTRILLI: No. 31. It would be
14 three pages from the end of that exhibit.

15 MR. ISKRA: To answer your question, not
16 directly, I had some input.

17 MR. CASTRILLI: Q. Sorry. Is there a
18 member of the panel who did answer it, who put this
19 together, or who was it?

20 MS. MURPHY: This is the Ministry's
21 answer to the question, Mr. Chairman, and a number of
22 the people here may have had input into it.

23 MR. CASTRILLI: Well, what I am trying to
24 identify is who that person is. I guessed tht Mr.
25 Iskra and I understand it's not --

1 MR. ISKRA: Well, I could help answer
2 some of your questions with the information I know
3 about it.

4 MR. CASTRILLI: Q. All right. Let's
5 start with Item (d). We asked for the particulars of
6 what the expected loss would be on the MAD, maximum
7 allowable depletion. Is that an answer that you
8 provided -- is that a question you provided the answer
9 to on the next page?

10 MR. ISKRA: A. No. My original
11 understanding of it was the existing MAD, but I was
12 told that that could not be calculated until it was
13 actually a damage or a loss after that five years and,
14 in which case, it would then affect the next five-year
15 MAD.

16 Q. All right. Well, just looking at the
17 answer you did provide -- that was provided, the answer
18 indicates that:

19 "Mad is calculated on the basis of the
20 area of production forests in the
21 management unit; that is, free to grow.
22 Severe defoliation and loss of trees to
23 budworm who affect the MAD calculation at
24 the time of the next renewal of the
25 timber management plan at which time

1 actual losses by area would be used."

2 If I can clarify, first of all, who is
3 predominantly responsible for that answer so I know who
4 to put the question to?

5 Mr. Galloway?

6 MR. GALLOWAY: A. Yes. I didn't write
7 that specific answer, but I can certainly answer that
8 yes.

9 Q. All right, fine. Well, could you
10 clarify for me first, Mr. Galloway, whether my
11 understanding of the answer is accurate.

12 The response seems to be saying that the
13 MAD is not affected immediately but five years hence at
14 the renewal of the next management plan. Is that what
15 the answer says?

16 A. Yes, that's what the answer says
17 there and that would be dependent upon the severity of
18 the loss and traditionally the insect loss builds up as
19 indicated in the chart we have already looked at this
20 afternoon, so if there was a catastrophic loss, as a
21 fire where it all happened at once, you would replant
22 and the procedure in the Class Environmental
23 Assessment, the TMP, allows for that replanting and
24 contingency plans.

25 This answer is what would happen in most

1 cases of an insect depletion. The five-year MAD would
2 be set at the start of that five-year period and you
3 would be gathering more information during that
4 five-year period on both the volume and the area
5 depleted and then at the next five-year period you
6 would use that information to recalculate.

7 Q. Is your answer to our interrogatory
8 consistent with the definition of MAD found in the
9 Timber Management Planning Manual, it's Exhibit 7?

10 A. Offhand I would say yes, but I will
11 look up the page, if you...

12 Q. 171.

13 A. Yes. The definition on page 171 of
14 the Timber Management Planning Manual:

15 "The calculated amount of area from
16 which timber may be depleted over the
17 five-year term of a timber management
18 plan by any means including harvesting,
19 fire, insects, disease, inoperability or
20 because of the allocation of the area to
21 other uses to fulfill the objectives of
22 management."

23 And that in fact does fit exactly with
24 the answer to your interrogatory.

25 If you note the term "the calculated

amount of area from which timber may be depleted", and
the maximum allowable depletion uses the area depletion
and a depletion by insects in the amount where it
didn't eliminate the total area or the total volume
from that area, you would still have the allowable
depletion on an area basis, but in fact you might get a
much reduced volume per area and that reduced volume
would take effect immediately.

Q. That's fine, thank you.

16 Let me just give the Board and the
17 parties the numbers these apply to. These are all
18 Forests for Tomorrow interrogatories for Panel 12 and
19 the numbers are as follows: 7, 9, 10, 14, 16, 17 and
20 21. I would ask this be made the next exhibit.

THE CHAIRMAN: Exhibit 671.

22 MR. CASTRILLI: (handed)

23 THE CHAIRMAN: Thank you.

1

2 MR. CASTRILLI: Q. Ms. Krishka, can you
3 confirm for me that the cycling of nutrients within
4 eco-systems, including forest eco-systems, is known as
5 biogeochemistry?

6 MS. KRISHKA: A. Could you repeat that,
7 please?

8 Q. Surely. Can you confirm that the
9 cycling of nutrients within eco-systems, including
10 forest eco-systems, is known as biogeochemistry?

11 A. Yes, I would.

12 Q. And as a general proposition, would
13 you agree that the major characteristic or a major
14 characteristic of biogeochemical cycles, especially in
15 forest eco-systems, is that most of the nutrients in
16 the cycle normally remain within a particular
17 eco-system, generally?

18 A. Would you mind repeating that?

19 Q. Sure. As a general proposition,
20 would you agree that perhaps the major characteristic
21 of biogeochemical cycles, especially in forest
22 eco-systems, is that most of the nutrients in the cycle
23 normally remain within the eco-system?

24 A. Generally I'd agree with that.

25 Q. And would you agree that over time

1 maintaining the biogeochemical balance of a forest
2 eco-system is important to maintaining the long-term
3 productivity of that forest?

4 A. Yes, I --

5 Q. As a general proposition?

6 A. Yes, I would.

7 Q. And would it be fair to say that
8 vegetation plays a very important role in forest
9 eco-system biogeochemistry?

10 A. Yes, it does.

11 Q. And that role includes nutrients
12 being accumulated and conserved by the vegetation?

13 MS. CRONK: Excuse me, Mr. Chairman,
14 before the witness answers, with no disrespect at all
15 intended toward the witness, I don't recall - and I may
16 be mistaken - but I don't recall Ms. Krishka or anyone
17 else on this panel being qualified as biogeochemists.

18 Now, I have no difficulty in an objection
19 sense to questions being put to the witness's general
20 knowledge based on her experience in forestry in areas
21 in which she has been qualified, but I do not recall
22 her being qualified to answer questions of this nature.

23 THE CHAIRMAN: Well, Ms. Krishka, is this
24 an area that is covered generally in a forestry
25 university course? Is this an area of study for a

1 forester?

2 MS. KRISHKA: In a very general sense,
3 yes, it is.

4 MR. CASTRILLI: It seems to me that the
5 witness has just qualified herself as capable of
6 answering the question.

7 MS. CRONK: Well, pardon me. I don't
8 want to get into that debate, but I don't agree at all,
9 sir --

10 THE CHAIRMAN: Well, Ms. Cronk, if the
11 questions are being asked of Ms. Krishka or any of the
12 other foresters in a very general way, is that a
13 problem to you?

14 MS. CRONK: Based on her general
15 experience, none at all, Mr. Chairman.

16 THE CHAIRMAN: Are you going to keep this
17 reasonably general, Mr. Castrilli?

18 MR. CASTRILLI: Yes. We are going to
19 actually be getting to the subject of herbicides very
20 shortly, and I think that is an area that she has been
21 qualified to deal with in relation to vegetation.

22 MR. FREIDIN: Mr. Chairman, I would like
23 to perhaps advise, through you, to advise to Mr.
24 Castrilli that as a general matter we have put forward
25 an expert in the subject matter that he is getting into

1 in terms of nutrient cycling and that was Mr. Armson,
2 and Mr. Greenwood, who was involved in the preparation
3 of that evidence, was also available in Panels No. 10
4 and 11, and I would hope that we are not going to,
5 through Ms. Krishka, attempt to revisit all of that
6 evidence when there was in fact an expert put forward
7 specifically to deal with that particular issue.

8 THE CHAIRMAN: No, I take it that Mr.
9 Castrilli is going to weave his way around to dealing
10 with this subject in terms of insecticides or
11 herbicides or the subject matter of this panel at some
12 point. Is that correct, Mr. Castrilli?

13 MR. CASTRILLI: Yes, it is. And perhaps,
14 Mr. Chairman, we might short circuit the difficulties
15 my friends are having by simply proposing to introduce
16 the next exhibit and I think all will become clear.

17 Q. Ms. Krishka, are you familiar with
18 Kimmmins on forest ecology?

19 MS. KRISHKA: A. Yes, since you provided
20 me a copy.

21 Q. It is also in your witness statement;
22 is it not, as a reference you cited?

23 A. It was referenced in the ESSA
24 Document.

25 Q. It is also referenced in your

1 Exhibit -- Document 4; is it not?

2 A. Which was a summary of that portion
3 of the ESSA Document.

4 Q. That's right. So you are familiar
5 with it; is that correct?

6 A. Yes.

7 Q. Your familiarity precedes my
8 providing you with the document on Friday; is that
9 correct?

10 A. Not to a great extent. The
11 co-authors that I prepared that paper with provided the
12 real expertise in that specific area.

13 MR. CASTRILLI: Mr. Chairman, I would
14 like to make this the next exhibit.

15 THE CHAIRMAN: Exhibit 672.

16 MR. CASTRILLI: And, Mr. Chairman, what
17 I am providing are excerpts from the book entitled:
18 Forest Ecology by J. P. Kimmmins, University of British
19 Columbia. The date of the book is 1987.

20 My understanding is that other excerpts
21 from this book have been previously made an exhibit.

22 (handed)

23 THE CHAIRMAN: Thank you.

24 ---EXHIBIT NO. 672: Book entitled: Forest Ecology by
25 J. P. Kimmmins, University of
 British Columbia, dated 1987.

1

2 MR. CASTRILLI: Q. Ms. Krishka, I
3 understand you have a copy of this; is that right?

4 MS. KRISHKA: A. Yes, I do.

5 Q. It is now Exhibit 672. Now, I
6 understand your testimony to be that tending, including
7 tending with herbicide use, is unlikely to cause
8 nutrient losses that would lead to a long-term decline
9 in forest productivity; is that correct?

10 A. That was the findings of the three
11 authors of which I was one, the paper that I included
12 in my evidence, and that was also taking into
13 consideration normal operating procedures.

14 Q. And would you agree that herbicide
15 applications are typically part of a series of timber
16 management activities which, in combination, may lead
17 to more significant adverse effects?

18 A. There is the possibility that such a
19 thing could occur under certain conditions and that's
20 stated in the paper.

21 Q. When you say that's stated in the
22 paper, you are referring to page 341 of your evidence,
23 your evidence being in Exhibit 603B?

24 A. That's correct.

25 Q. And is it also true that in marginal

1 areas, Ms. Krishka, such as rocky sites with very thin
2 soils or poorly drained sites, that herbicide use in
3 combination with other treatments could lead to
4 relatively long-term changes in forest site quality?

5 A. Yes, it is possible under those
6 specific conditions. If you were to use -- if you were
7 to practice all those silvicultural treatments as
8 discussed in the sentence prior to that.

9 MR. HYNARD: A. This is an area that
10 was covered in great detail by Mr. Armson in Panel 9
11 looking at harvest site preparation and herbicide use
12 in combination and he did talk about nutrient loss from
13 the system, he did state that it did occur.

14 He said that in Ontario it did not exceed
15 the losses that occurred naturally in the natural
16 environment by natural disturbances, including wild
17 fire.

18 I think Mr. Castrilli really is in the
19 area of revisiting some of Mr. Armson's evidence.

20 MR. CASTRILLI: Mr. Chairman, with all
21 due respect, my friends have produced quite a lot of
22 material on this subject in this panel, Panel 12, not
23 Panel 9.

24 I am fully entitled to ask questions as
25 it relates to this material. Certainly I am permitted

1 to ask questions with respect to documents that are
2 referred to in this material as well.

3 THE CHAIRMAN: Go on.

4 MR. CASTRILLI: Q. Now, Ms. Krishka,
5 would you agree that under certain conditions timber
6 management practices, including use of herbicides, can
7 alter biogeochemical mechanisms in ways that might lead
8 to significant changes in that balance in the forest?

9 MS. KRISHKA: A. Could you repeat that
10 question, please?

11 Q. Would you agree that under some
12 conditions timber management practices, including
13 herbicide use, can alter biogeochemical mechanisms in
14 ways that lead to a significant change in the
15 biogeochemical balance of a forest?

16 A. It would be possible under extreme
17 conditions.

18 Q. That's fine. Now, your testimony
19 refers to an exhibit at Hubbard Brook, page 342?

20 A. Yes, it does.

21 Q. And this involved clearcutting of a
22 forest watershed and treatment of the area with
23 herbicides for several seasons to prevent any regrowth;
24 is that correct?

25 A. Yes, it did.

1 Q. And you described or summarized the
2 study at page 342 and then you indicate that the
3 Hubbard Brook experiment is not representative of
4 operational practices?

5 A. No, it is not.

6 Q. And then you go on in the third
7 paragraph to refer to subsequent studies at Hubbard
8 Brook and elsewhere which you state have:

9 " ...demonstrated that less severe
10 treatments which do not prevent regrowth
11 of vegetation and also provide mitigating
12 factors can greatly reduce nutrient loss
13 from the sites."

14 Is that right?

15 A. Yes, we did.

16 Q. Then you go on to note that:

17 "Normal operational use of herbicides
18 will not significantly affect forest
19 productivity in the long term, though
20 care should be taken to avoid prolonged
21 periods of minimal vegetation after
22 harvesting, particularly on marginal
23 sites."

24 Is that right?

25 A. Yes.

1 Q. Can you confirm for me, Ms. Krishka,
2 that subsequent investigations of commercial harvesting
3 in the Hubbard Brook Region have yielded slightly
4 dramatic but essentially similar results to the Hubbard
5 Brook experiments that you refer to at page 342?

6 A. Yes, although your terminology of the
7 use slightly can be significant. You are getting the
8 same results but -- or rather...

9 Q. Would you like me to ask that
10 question, again?

11 A. Yes. Yes, please.

12 Q. Can you confirm that subsequent
13 investigations of commercial harvesting in the Hubbard
14 Brook Region have yielded slightly less dramatic but
15 similar results to the Hubbard Brook experiments that
16 you describe at page 342?

17 A. Yes. There were studies that yielded
18 essentially similar results although they were found to
19 be significantly different from the results found in
20 Hubbard Brook.

21 Q. Now, we have entered into evidence
22 Exhibit 372 which is the excerpts from Kimmens. I will
23 refer you to page 116 of Exhibit 672.

24 MR. FREIDIN: What page?

25 MR. CASTRILLI: 116.

1 MS. KRISHKA: Yes?

2 MR. CASTRILLI: Q. We are looking at the
3 heading under (a) which is entitled: Alteration of the
4 Role of Vegetation, A Devegetated Watershed at Hubbard
5 Brook, New Hampshire. And looking at what would be the
6 eighth line down in that paragraph, beginning with the
7 phrase "However...", do you have it?

8 MS. KRISHKA: A. Yes.

9 Q. Dr. Kimmims says:

10 "However, if either the rate of nutrient
11 uptake by vegetation or the rate of
12 nutrient release by decomposition or both
13 is altered, a change in the
14 biogeochemical balance may occur."

15 Do you agree?

16 MS. CRONK: Again, Mr. Chairman, I am
17 sorry. Does she agree that that is what the author
18 said, or is Mr. Castrilli asking her for her opinion in
19 the area of biogeochemistry, if that is a fact, because
20 if it's the latter, I'm compelled to object.

21 MR. CASTRILLI: I'm asking as a general
22 proposition with reference to a report signed by Ms.
23 Krishka in her evidence, what she agrees with respect
24 to that general proposition? It's entirely reasonable,
25 relevant and admissible.

1 MS. CRONK: Well...

2 THE CHAIRMAN: Just a moment. Why, Ms.
3 Cronk, are you disagreeing -- or objecting rather? Are
4 you objecting on the grounds that Ms. Krishka, based on
5 her experience, does not have sufficient experience for
6 her to give an opinion in the area of biogeochemistry?

7 MS. CRONK: I am, sir. I have no
8 difficulty at all with a question to her based on the
9 literature review which she did and reported upon as to
10 whether this is the opinion expressed by this author, I
11 have no difficulty with that at all.

12 However the question was framed, it
13 seemed to me, was to elicit an opinion from Ms. Krishka
14 as to whether that is in fact the case, whether she
15 agrees that that is the result. And if that is so,
16 then she is not qualified to answer that.

17 THE CHAIRMAN: Ms. Krishka, based on your
18 studies or education in this area, would you feel
19 qualified to give an opinion on that last question?

20 MS. KRISHKA: I would tend to agree with
21 Ms. Cronk, I'm not a biogeochemist, I'm not a
22 specialist in nutrient cycling. I think that in light
23 of the fact that you have received a lot of evidence
24 from Professor Armson, I would defer to him.

25 I think I could generally agree with

1 certain statements in a very general sense.

2 MR. CASTRILLI Mr. Chairman, I have a
3 problem with Ms. Cronk's objection. I have a further
4 problem with the witness' response.

5 We have a document, or a document within
6 a document commencing at page 338: Effects of Chemical
7 Cleaning on Long-Term Forest Productivity, and running
8 to page 356 in which all of the issues which I'm
9 raising questions about are dealt with. This is part
10 of the document filed by Ms. Krishka and I cannot
11 imagine how it's in here if she is not competent to
12 respond to it.

13 MS. KRISHKA: I think I might be able to
14 help clarify. One of the co-authors of that document
15 was Mr. Kurtz who was a Ph.D. student of Dr. Kimmons at
16 the time we wrote this, in fact he was there
17 representing Dr. Kimmons and his input in that paper
18 would be speaking specifically to these types of
19 topics.

20 I agree with everything that is in the
21 paper that we submitted, but I was not providing the
22 expertise in those specific areas for that paper.

23 MS. MURPHY: Mr. Chairman, if I might
24 wade in here for a minute. It appears that, as has
25 been said before, the issue that is being dealt with

1 here is a question about rates of decomposition, rates
2 every nutrient uptakes and so forth and that is
3 evidence that has been dealt with before this Board
4 previously in Panels 9, 10, 11.

5 THE CHAIRMAN: But not necessarily with
6 the impact of insecticides or herbicides on those
7 rates.

8 We didn't deal with that in that panel,
9 we dealt generally with the topic of nutrient rates and
10 intakes and uptakes and those kinds of things, but
11 certainly we didn't deal on those panels with the
12 effect or impact of herbicides and insecticides.

13 Would you agree with that?

14 MS. MURPHY: Actually I think we will
15 find that in direct -- the question was directly put to
16 Mr. Armson, whether the use of herbicide in those
17 situations would have any effect and it was dealt with
18 very generally, it's true, but the same issues were
19 dealt with at any rate.

20 MR. FREIDIN: Having been there, Mr.
21 Chairman, if Professor Armson did deal with the effect
22 of the removal of vegetation on nutrient cycling and
23 the like, water yield, a number of different things, we
24 rely on his evidence. He is our expert in relation to
25 the subject matter of the effect of the removal of

1 vegetation on nutrient cycling and the subject matters
2 upon which he testified.

3 Now, this panel does deal with
4 herbicides. This panel has admitted that herbicides
5 has an effect on the vegetation on the site. But it's
6 a matter of degree. This panel can characterize for
7 the benefit of the Board and Mr. Castrilli's client the
8 extent to which vegetation is affected by the
9 application of herbicides. It has been characterized
10 by the witnesses in-chief as being minimal, it does not
11 affect all the vegetation, doesn't remove it, et
12 cetera.

13 And to the extent - and I would suggest
14 that the Board elicit -- take the evidence of this
15 panel as to the extent to which vegetation is affected
16 by the activity of the application of herbicides,
17 compare it based on the evidence of this panel to the
18 evidence of Professor Armson who spoke about the
19 removal of vegetation through the activity of harvest
20 and come to general conclusions based on the
21 significance, if any, or the significance of the
22 application of herbicides, having regard to the amount
23 of vegetation that it removes and the manner in which
24 it may affect vegetation on the site.

25 I believe that that is an appropriate

1 pulling together of the evidence of the two panels and
2 an appropriate way to present the evidence. In fact
3 it's the only practical way to deal with this complex
4 subject matter and that is why the evidence was
5 prepared in this fashion. I would submit that it
6 should be dealt with in that fashion.

7 MR. CASTRILLI: Mr. Chairman, with all
8 due respect to my friends, I have a great deal of
9 difficulty with the inclusion of a document within Ms.
10 Krishka's evidence called: Effects of Chemical
11 Cleaning on Long-Term Forest Productivity which
12 includes numerous references which somebody relied upon
13 to put this material together and yet there is no
14 witness here to speak to them.

15 Now, we were told during the scoping
16 session that in fact the ESSA Document, which I gather
17 has this reproduced - when we get there in August we
18 will deal with that then - would not in fact redo
19 evidence with respect to forestry effects of herbicides
20 and that this was the panel to deal with it; not Panel
21 9, not Panel 10, not Panel 11, this panel.

22 Now, if this document is not something
23 that Ms. Krishka can speak to, then there is in fact no
24 evidence before this Board because nobody on this panel
25 is in a position to adopt this statement.

1 So we are at the impasse that either this
2 part of the evidence is removed, no weight given to it,
3 or Ms. Krishka has to be in a position to speak to it.

4 You cannot have documents within
5 documents that are purportedly relied upon witnesses
6 that in fact they cannot speak to.

7 MS. MURPHY: As I understood our
8 situation right now, perhaps we better go back and look
9 at it, Mr. Castrilli is asking the witness to speak to
10 this document here.

11 MR. CASTRILLI: Which is referred to in
12 numerous places in the Panel 12 evidence. It's
13 referenced and it's cited.

14 I'm certainly entitled to ask questions
15 about documents that are referred to and relied upon by
16 the witness in a document prepared and included in
17 material she has filed with this Board and wants this
18 Board to rely on.

19 THE CHAIRMAN: Anything further?

20 MS. CRONK: Yes. Mr. Chairman, for my
21 part, can I only put what I thought was a simpler point
22 in an objection a different way and, that is, Ms.
23 Krishka has given evidence that she conducted and was a
24 participant in conducting an extensive literature
25 review on certain issues.

1 The document that is before you and about
2 which she has given evidence-in-chief includes that
3 literature review. On behalf of our clients, I am not
4 objecting to any question being put to her that speaks
5 to documents mentioned in her literature review or
6 referenced in any way in that document, but that does
7 not mean that the area of the scientific expertise is
8 such that she can express an originating opinion on the
9 subject matter dealt with in some of those articles.

10 There is a distinction between saying I
11 read the following ten books and they say the
12 following, and I put myself in the same category as
13 those authors and express an independent opinion. It's
14 the latter I'm objecting to, not the former.

15 Of course Mr. Castrilli is free, in my
16 submission, to cross-examine on matters referred to in
17 documents, as long as he's not eliciting or seeking to
18 elicit a scientific opinion the witness is not
19 qualified to give.

20 THE CHAIRMAN: And what is your client's
21 opinion, Ms. Cronk, with respect to whether or not this
22 document should be included in the evidence relating to
23 pesticides and herbicides?

24 MS. CRONK: This document, meaning the
25 one Mr. Castrilli just marked or Ms. Krishna...?

1 THE CHAIRMAN: That's right.

2 MS. CRONK: I have no difficulty with
3 that being marked at all, given it was referenced.

4 THE CHAIRMAN: I think it's time for us
5 to have a pow-wow, at least based on your objections,
6 and I think from that we will have to take our
7 adjournment as well, so we will probably not return
8 until 3:30.

9 Thank you.

10 ---Recess taken at 2:45 p.m.

11 ---On resuming at 3:45 p.m.

12 THE CHAIRMAN: Thank you. Be seated,
13 please.

14 Mr. Castrilli, the Board spent more than
15 a few minutes discussing your objection and also the
16 objections raised by Ms. Cronk with reference to the
17 evidence adduced by this panel on the area of
18 biogeochemistry and, in particular, that part of the
19 paper authored or co-authored by Ms. Krishka commencing
20 on page 245 of Exhibit 603B.

21 Ms. Krishka has stated that her
22 experience is not in the area of biogeochemistry and
23 she only has a very general knowledge of that area
24 resulting from her forestry studies and experience and
25 that the statements in her paper relating to that

1 scientific area were in fact contributed by a Ph.D.
2 student of Dr. Kimmons.

3 Do I have that right?

4 MS. KRISHKA: Yes.

5 THE CHAIRMAN: That person has not been
6 called as a witness on this panel and there appears to
7 be no other witness on the panel qualified to speak on
8 this evidence.

9 Although Professor Armson dealt with the
10 evidence concerning nutrient recycling -- or cyclihng
11 rather in Panel 10, he did not deal, except in a very
12 general way, with the possible effects of chemical
13 cleaning and tending on nutrient cycling and has not
14 been produced for this panel to deal with questions
15 relating to the use of herbicides on nutrient cycles.

16 And my colleague indicates that perhaps
17 it was Professor Armson's evidence in Panel 9 rather
18 than Panel 10 as I stated.

19 If the Ministry wishes to rely upon the
20 evidence set out in Ms. Krishka's paper to which she is
21 not qualified to speak, then it is the Board's view
22 that it is encumbent upon the Ministry to produce a
23 qualified witness to deal with questions arising out of
24 this evidence, failing which the Board will disregard
25 such evidence.

1 And that, I think, is the substance of
2 the Board's ruling on your objections and the Ministry
3 can act accordingly.

4 And, Ms. Krishka, I don't think under the
5 circumstances, based on your admitted inexpertise on
6 this area, that you can really be asked questions of
7 any substance on the area of biogeochemistry.

8 And I think we have it correctly that
9 that part of your paper was in fact contributed to by
10 someone else; is that correct?

11 MS. KRISHKA: When you speak specifically
12 about biogeochemistry, in that aspect --

13 THE CHAIRMAN: Just that aspect.

14 MS. KRISHKA: Just that aspect.

15 THE CHAIRMAN: We are only dealing with
16 that aspect of your paper. Obviously the areas of your
17 paper upon which you have expertise yourself --

18 MS. KRISHKA: The paper is really based
19 on general principles and the general principles are
20 based on the current state of knowledge and I'm
21 familiar with the general principles, as would be most
22 foresters.

23 THE CHAIRMAN: But I don't think you can
24 really express an opinion on the area of
25 biogeochemistry.

1 MS. KRISHKA: My opinion would simply be
2 based on the state of knowledge that is from those
3 experts.

4 THE CHAIRMAN: Ms. Murphy.

5 MS. MURPHY: Yes. If I just might, I
6 think the point to be made is this: That in Panel 9
7 Professor Armson came and spoke about, as you will
8 recall, nutrient cycling and you recall him talking
9 about pools and fluxes and so forth and he was talking
10 there about the effect generally of biomass removal and
11 he put in that evidence so that subsequent evidence
12 could be understood.

13 THE CHAIRMAN: And you may wish to rely
14 on that evidence--

15 MS. MURPHY: Fine.

16 THE CHAIRMAN: --that Professor Armson
17 put in. What we are saying is, if you wish to rely on
18 the evidence of the possible effect of herbicides on
19 the nutrient cycles as set out in terms of any
20 conclusions which may have been reached in the paper
21 co-authored by Ms. Krishka then she, in our opinion, is
22 not qualified to answer the questions on that area.

23 MS. MURPHY: Well, I think you will
24 recall that Professor Armson, when he did give his
25 evidence, explained that foresters have to understand

1 the basics of the nutrient cycle; they don't have to be
2 able to explain to you how it happens and in detail
3 what is happening, but they have to know the elements
4 that affect that.

5 And the point of this panel is that,
6 given that general understanding of the nutrient cycle,
7 they are there to discuss what are the effects of this
8 part of the biomass removal which is biomass removal by
9 tending, not of course exclusive to herbicide but all
10 tending.

11 And that was the point as well in Panel
12 10 where you were given evidence about the effects of
13 what is really the major part of the biomass removal
14 harvest. So the elements to what affect it are
15 certainly required knowledge, but I think we may have
16 sort of confused things by raising this to the level of
17 biogeochemistry, whatever that may mean.

18 I think the point to be made here is that
19 the people who put together the article that you are
20 discussing, the Effects of Chemical Cleaning on
21 Long-Term Forest Productivity, in order to write that
22 article as a stand-alone piece, they had to give you
23 some background and, in effect, the background that was
24 described earlier by Professor Armson.

25 Our point with the Board is simply this:

1 Because this group of people had to stand back and give
2 you a little bit of background in order to carry on and
3 talk about herbicide, doesn't mean that this Board
4 needs to go right back to the beginning and hear all of
5 that basic evidence over again. And I think that was
6 the point we were trying to break.

7 THE CHAIRMAN: Well, we are certainly not
8 hearing the evidence over again. All we are saying is,
9 we are cognizant of Professor Armson's evidence on this
10 area.

11 What we are saying though, in effect, is
12 that we feel that there is nobody on this panel,
13 including Ms. Krishka, that can properly answer the
14 questions on biogeochemistry, she is not qualified in
15 that area.

16 If you wish to rely on that kind of
17 evidence for this panel, then we feel it is incumbent
18 on the Ministry to produce a witness that can answer
19 questions in those areas and give opinion evidence, if
20 necessary.

21 And therefore to that extent, Mr.
22 Castrilli, your objection is sustained.

23 MR. CASTRILLI: Thank you, Mr. Chairman.
24 Mr. Chairman, I presume your ruling also
25 applies to that part of what would be Exhibit 604C

1 which is a reproduction of the same portions of the
2 paper that appears in Exhibit 603B.

3 MR. MARTEL: B you mean?

4 MR. CASTRILLI: B.

5 THE CHAIRMAN: That's correct.

6 MS. MURPHY: Well, Mr. Chairman, again,
7 to help us clarify. Your ruling does not, however,
8 suggest that Ms. Krishka or any of the other foresters
9 are incapable of advising about the directional nature
10 of biomass removal and things related to that which
11 could have effects on nutrient cycle?

12 THE CHAIRMAN: No. No, we aren't.

13 MS. MURPHY: Thank you.

14 MR. CASTRILLI: Mr. Chairman, in light of
15 your ruling, I wonder if you would bear with me while I
16 gingerly step my way through my remaining material on
17 this issue so as not to offend your ruling.

18 You will recognize probably should have a
19 scissor and a staple to reformulate the questions, but
20 if you would permit me to proceed and, if there are
21 further questions the Board believes offend the ruling,
22 understand that it is done not deliberately but only
23 because it is difficult to excise everything that might
24 otherwise be impermissible.

25 THE CHAIRMAN: See this is, in the

1 Board's view, one of the first instances in this very
2 long hearing that a paper has been produced reaching
3 certain conclusions where the authors of that paper --
4 sorry, where one author of the paper is purporting to
5 speak for the others on certain areas and yet the
6 author purporting to speak on other areas is, in
7 herself, not qualified to speak in those areas. That
8 is part of the difficulty that we have had.

9 MS. MURPHY: I think, I better mention
10 it's a difficulty that we will probably have again
11 because this is going to happen when people are dealing
12 with the substance of the ESSA Document and, in those
13 situations, there are approximately 20 people who got
14 together and wrote the document and it's not our view
15 that we will be calling the 20 people who got together
16 to write that document.

17 THE CHAIRMAN: But will not the person
18 who is addressing the topics be qualified in their own
19 right to speak on some of those topics?

20 MS. MURPHY: Yes, they will, but they
21 will have to account to you, as a matter of fact, some
22 of the information that was put in by the other 19
23 people and we will have to bear that in mind.

24 MR. CASTRILLI: Mr. Chairman, it's
25 conceivable we may be revisiting this problem when we

1 get to August, but let's wait until August to worry
2 about it. I have raised the matter off the record with
3 Ms. Murphy already.

4 Let me try one question to see whether I
5 fall into error almost immediately.

6 Q. Ms. Krishka, we were looking at page
7 116 of Exhibit 672 under the heading (a) Alteration of
8 the Role of Vegetation, a Devegetative Watershed. Do
9 you recall that discussion?

10 MS. KRISHKA: A. Yes.

11 Q. Now, the sentence immediately after
12 the sentence that caused the one hour or so delay reads
13 the following:

14 "An example of this is the study that
15 examined the changes in the..."

16 That word:

17 "...balance of a mature northern hardwood
18 forest when nutrient uptake by the
19 vegetation was eliminated through the use
20 of clearcutting and herbicides."

21 Do you see that sentence?

22 A. Yes.

23 Q. And the next page 117, bottom of 116
24 and 117 on the next page, describes the Hubbard Brook
25 experiments and indicates that the study, as I believe

1 you pointed out in your summary, indicates that the
2 study cannot be applied uncritically because the
3 treatment that was applied was not representative of
4 conventional forest management.

5 A. That's correct.

6 Q. Moving on, however, to page 118 and
7 at the top Kimmins notes that:

8 "Subsequent investigations of commercial
9 harvesting of yellow birch in the Hubbard
10 Brook Region have yielded slightly less
11 dramatic but essentially similar
12 results."

13 Do you see that sentence?

14 A. Yes.

15 Q. Now, when I referred you to page 342
16 of your evidence and your summary of Hornbeck's work
17 you say that:

18 "Hornbeck's work stands for the
19 proposition that less severe treatments
20 which do not prevent regrowth of
21 vegetation and also provide mitigating
22 factors can greatly reduce nutrient loss
23 from sites."

24 Do you recall that evidence?

25 A. Yes.

1 Q. Kimmmins, looking at the same study by
2 Hornbeck says that:

3 "It stands for the proposition that
4 commercial harvesting at Hubbard Brook in
5 fact yielded slightly less dramatic but
6 essentially similar results to the
7 Hubbard Brook investigations."

8 Does your interpretation concur with
9 Kimmmins?

10 A. My interpretation of that study is
11 that Hubbard Brook looked -- in the initial study when
12 they looked at herbicides, were looking at basically
13 first principles and they made certain -- came up with
14 conclusions that followed basic principles.

15 When Hornbeck went in and looked at strip
16 cutting in relation to the herbicide study at Hubbard
17 Brook, they found that the basic principles were the
18 same but the magnitude of the response was different
19 and that changed -- the difference in the magnitude of
20 response is quite crucial.

21 Q. Let's return to the question I asked
22 you. Kimmmins looking at Hornbeck says one thing, and
23 you say something, and what I'm asking you is: What
24 Kimmmins says about Hornbeck, is it the same as what you
25 are saying about Hornbeck?

1 A. Yes, I believe it is.

2 Q. You do.

3 A. He says less dramatic but essentially
4 similar results.

5 Q. Do you agree with me, and take this
6 subject to verification, that Hornbeck's conclusion on
7 this point was that studies showed that nutrient losses
8 in drainage waters after conventional clearcutting were
9 less than those from complete clearing, and what he's
10 referring to there -- or what he is referring to there
11 is Watershed 2, the watershed that was clearcut and
12 then held there for "x" years?

13 * A. Well, I believe...

14 Q. Sorry, I haven't finished the
15 sentence, but that the losses were still significant?

16 A. I believe he said that, but I think I
17 would like to refer to the paper and that paragraph.

18 Q. That's fine, we are going to.

19 MR. CASTRILLI: Mr. Chairman, since we
20 have been talking about Hornbeck, it was inevitably
21 incumbent upon me to produce Hornbeck.

22 I believe Ms. Krishka has indicated her
23 familiarity with the paper we are referring to. I
24 would like to make it the next exhibit.

25 THE CHAIRMAN: Exhibit 673.

1 MR. CASTRILLI: (handed)

2 THE CHAIRMAN: Thank you.

3 ---EXHIBIT NO. 673: Article entitled: Strip Cutting
4 as a Means of Protecting Site and
5 Streamflow Quality when
6 Clearcutting Northern Hardwoods by
7 J.W. Hornbeck, G.E. Likens, R.S.
8 Pierce, and F.H. Bormann.

9

10 MR. CASTRILLI: Q. Ms. Krishka, I
11 understand you have a copy of what is now Exhibit 673?

12 MS. KRISHKA: A. Yes, I do.

13 Q. I would ask you to turn to page 210
14 of that exhibit. Now, under the heading: Previous
15 Studies on that page, what my understanding is that
16 what Hornbeck is referring to there is the Watershed 2
17 watershed which was they call clearfelled or clearcut
18 in December of 1965 and for which herbicides were
19 applied for three successive growing seasons; is that
20 right?

21 A. That's right.

22 Q. Now, in the next paragraph Hornbeck
23 notes that:"

24 "The Watershed 2 results posed questions
25 about the extent of nutrient loss that
 might occur after a harvest clearcut..."
So as a result of that, a study was undergone in which
she monitored -- or he monitored, excuse me:

1 "...nutrient outflow in a stream water
2 from eight clearcut and adjacent uncut
3 forests in the White Mountains."
4 And then summarizing that work in the
5 next sentence he says briefly:

6 "That study showed that nutrient losses
7 in drainage waters after conventional
8 clearcutting were less than those from
9 complete clearcutting" -- excuse me:
10 "...complete clearing of Watershed 2 but
11 that the losses were still significant."
12 Do you see that there?

13 A. That's what it says.

14 Q. Do you agree with that conclusion?

15 A. Well, I would have to assume that he
16 read this study and that his conclusions were accurate.
17 Not being familiar with those studies exactly, I would
18 just have to say that that is what it says in this
19 paper.

20 Q. And you have no independent
21 capability of indicating whether you agree with the
22 conclusion or not?

23 A. I -- significance is a statistical
24 term and it would be -- the significance would be
25 dependent on how they did the analysis and what they

1 determined to be significant.

2 So I would just have to say, yes, that is
3 what he says and based on whatever assumptions they were
4 using in their statistical analysis that, yes, they did
5 find it to be significant.

6 Q. So you are not in a position to
7 indicate agreement -- or concurrence or non-concurrence
8 with that assessment by Hornbeck, but you are in a
9 position at page 342 to draw the conclusions you draw
10 there about Hornbeck; is that right?

11 A. Well, certainly I have said that
12 other studies, including Hornbeck's, have found less
13 severe treatments due -- I would have to read the whole
14 thing:

15 "Less severe treatments do not prevent
16 regrowth of vegetation and would also
17 provide mitigating factors such as buffer
18 strips along streams can greatly reduce
19 the amounts of nutrients lost from the
20 site."

21 And I think that is -- that concurs with
22 Hornbeck.

23 Q. Except Hornbeck says the losses are
24 still significant.

25 A. And I said less severe.

1 Q. Didn't Hornbeck also say, and didn't
2 Hornbeck also conclude that nutrient losses from strip
3 cutting were well below that which occurred after
4 forest clearing and conventional clearcutting?

5 A. Yes, he did say that.

6 Q. Page 223 of Exhibit 673. Do you
7 agree with that assessment?

8 THE CHAIRMAN: Where is that statement on
9 223?

10 MR. CASTRILLI: Sorry, Mr. Chairman it's
11 at the bottom of the page under summary. That is the
12 last sentence.

13 MS. KRISHKA: I would agree.

14 MR. CASTRILLI: Q. You agree with that
15 assessment, not simply that he said it?

16 MS. KRISHKA: A. I would agree.

17 Q. Would you also agree that the
18 conclusions resulting from the Hubbard Brook
19 experiments on clearcutting and enforced devegetation
20 by herbicides also apply to commercial clearcutting?

21 A. Could you repeat that, please?

22 Q. Could you also agree that the
23 conclusions resulting from the Hubbard Brook
24 experiments on clearcutting and enforced devegetation
25 by herbicides also apply to commercial clearcutting?

1 A. No, I would not, not in general
2 terms, if you are talking about the end results.

3 And I think that Kimmins stated that
4 himself. In the sentence that you had quoted earlier
5 he said that:

6 "findings of the initial Hubbard Brook
7 Study cannot be applied uncritically to
8 other watersheds because the treatment
9 that was applied was not representative
10 of conventional forest management."

11 Q. Who did the Hubbard Brook
12 experiments, Ms. Krishka?

13 A. There were a number of Hubbard Brook
14 experiments.

15 Q. Is Bormann one of the principal
16 experimenters?

17 A. He wrote papers on the one in
18 Watershed 2.

19 Q. That's right, which is the watershed
20 that was devegetated with herbicides; is that right?

21 A. That's right.

22 Q. I understand you are familiar with
23 Bormann and Likens, Pattern and Process in a Forested
24 Ecosystem?

25 A. Yes.

1 Q. And you have been provided with a
2 copy--

3 A. Yes.

4 Q. --of excerpts thereof?

5 A. Yes.

6 MR. CASTRILLI: Mr. Chairman, I would ask
7 that this be made the next exhibit.

8 THE CHAIRMAN: Exhibit 674.

9 MR. CASSIDY: (handed)

10 THE CHAIRMAN: Thank you.

11 ---EXHIBIT NO. 674: Excerpt of article entitled:
12 Pattern and Process in a Forested
Ecosystem by F.H. Bormann and G.E.
13 Likens.

14 MR. CASTRILLI: Q. Now, Ms. Krishka, I
15 asked you whether the conclusions resulting from the
16 Hubbard Brook experiments on clearcutting and enforced
17 devegetation by herbicides also apply to clearcutting
18 and your answer was no; is that right?

19 MS. KRISHKA: A. Could you repeat it?

20 Q. I asked you whether the conclusion
21 resulting from the Hubbard Brook experiments on
22 clearcutting and enforced devegation by herbicides also
23 apply to commercial clearcutting and your answer was
24 no, as I recorded it.

25 A. I think I qualified that.

1 Q. Sorry, would you indicate then how
2 you qualified it, if you can remember?

3 A. I believe I said no, and referred to
4 the reference in Kimmmins that said that under normal
5 operating conditions it may not be comparable.

6 MS. MURPHY: I wonder if my friend can
7 advise what the year of this publication is?

8 MR. CASTRILLI: 1979.

9 MS. MURPHY: As I understand these are
10 on-going studies, I'm going to have to look at them,
11 according to the date you've given.

12 MR. CASTRILLI: Q. I would like to refer
13 you to page 100 of Exhibit 674. The first full
14 paragraph on the page under the heading: Relationship
15 of the Deforestation Experiment to Commercial
16 Clearcutting.

17 Bormann and Likens asked a rhetorical
18 question which they answer in the next sentence. They
19 ask:

20 "Are conclusions resulting from the
21 clearcutting and enforced devegetation
22 experiment applicable to clearcuts where
23 revegetation occurs quickly?"

24 And they answer their question with:
25 "We think they are."

1 And they go on to describe why. And your
2 testimony is that you do not think they are, in light
3 of the assessment by Kimmins; is that right?

4 MS. KRISHKA: A. I was referring to the
5 results and I think in this sentence they are talking
6 about the conclusions which are really two different
7 things.

8 I think that they, as a result of this
9 particular study, developed certain basic principles or
10 assumptions of certain basic principles which were
11 their conclusions and, as Kimmins said, you cannot
12 directly relate the results from that particular study
13 to normal operating cutting conditions, but that's not
14 to say that the basic principles do not apply.

15 In fact, on the next page, the third
16 paragraph down, the authors state:

17 "Thus the clearcutting and enforced
18 devegetation experiment provides a good
19 qualitative model of the interactions
20 triggered by destruction of the dominant
21 vegetation of the northern hardwood
22 ecosystem."

23 They go onto say:

24 "The quantitative aspect of the models
25 when applied to a commercial clearcut

1 would vary in relation to the rapidity
2 which which active and passive plant
3 processes were restored after cutting."

4 So in answer to your question -- your
5 earlier question, I was qualifying that because I would
6 not necessarily disagree with the basic principles that
7 were part of the conclusion of the Hubbard Brook study,
8 but you do have to take care when you try to take the
9 results of a study such as the Hubbard Brook which
10 really is a very extreme situation and try to apply it
11 to a normal operating situation.

12 Q. Ms. Krishka, I recall - and I have
13 written it down on the page where I wrote it - that I
14 asked you whether the conclusions from the Hubbard
15 Brook experiments on clearcutting and enforced
16 devegetation by herbicides also apply to commercial
17 clearcutting. I didn't ask you about the results.
18 So...

19 MS. MURPHY: She answered about the
20 results.

21 MR. CASTRILLI: Well, she answered a
22 question I didn't ask. I would like an answer to the
23 question I did ask.

24 MS. KRISHKA: I'm sorry for misreading
25 your question and if your question was, if I agree with

1 the conclusions, I would have to agree with them in the
2 sense that they were developing basic principles which,
3 based on that particular study, were sound. I would
4 agree with that.

5 MR. CASTRILLI: Q. Thank you. Now, if I
6 could just refer you back to page 27 and 28 of Exhibit
7 674. What Hubbard -- or, excuse me, what Bormann is
8 doing on these pages is describing a series of studies
9 that he was involved in; is that right, in relation to
10 Hubbard Brook?

11 MS. KRISHKA: A. I believe so.

12 Q. And I believe he indicates that he
13 had been doing these studies in close cooperation with
14 the U.S. Forest Service--

15 A. Yes, he states --

16 Q. --for the last 15 years; is that
17 right?

18 A. Yes, he states that.

19 Q. So he is one of the principal
20 experimenters, principal researchers who have produced
21 work on Hubbard Brook; is that right?

22 We are not talking about derivative work,
23 we are talking about primary research; is that right?

24 A. It would appear that way, yes.

25 Q. Now, I will refer you to page 102 of

1 Exhibit 674.

2 MR. FREIDIN: What page, I'm sorry, Joe?

3 MR. CASTRILLI: 102.

4 Q. Sorry. Before I leave page 27 of the
5 same exhibit, I just wanted to get your understanding
6 of what the work that was done at Watershed No. 2
7 involved. And would you simply confirm for me that
8 what occurred there on that particular watershed was
9 experimental deforestation and the maintenance for
10 three years -- sorry, let me rephrase the question.

11 Watershed 2 was experimentally deforested
12 and maintained there for three years before vegetation
13 was allowed to regrow; is that right, and that's your
14 general understanding of what that study has been all
15 about?

16 MS. KRISHKA: A. Yes. Specifically they
17 cut the area and left the material that was cut on the
18 forest floor and then they tended the area for the
19 following three years.

20 The first year they applied a very high
21 rate of herbicide called bromocile which is a soil
22 sterilant, in fact they used a rate twice as high as
23 what we -- is recommend here in Ontario for soil
24 sterilization.

25 The following year they had to go back in

1 with 2,4,5-T to do spot treatments of sprouts that
2 regrew even given the soil sterilant treatment and a
3 third year they had to go back and do that again. And
4 by that, they kept the area denuded of vegetation.

5 Q. Fine. Could I now ask you to turn to
6 page 102. Now, we are looking at Item 4 on that page
7 near the bottom.

8 A. Yes.

9 Q. He notes that:

10 "Evidence is presented in the body of the
11 report showing that models developed for
12 the ecosystem that was clearcut and held
13 bare are applicable to commercially
14 clearcut forests. "

15 Now, we have already talked about this in
16 terms of general conclusions. Your difference with the
17 findings of Bormann, if I can put it that way, relate
18 to the actual results; is that right?

19 A. I don't know that I have a difference
20 with Bormann. I am not sure if I know what you are
21 referring to.

22 Q. Well, you indicated earlier that you
23 didn't want to agree with the question I asked you as
24 to whether -- or you did indicate that you agreed with
25 the conclusions arising from Bormann's work but not

1 necessarily the results in terms of whether they are
2 applicable elsewhere; is that right, the particular
3 results?

4 A. Well, I don't have any problem with
5 the results he got in his particular study. The
6 question of whether they were applicable elsewhere, is
7 another question.

8 Q. Well, exactly. So you agree with the
9 conclusions but not the particular results as they
10 might appear elsewhere; is that right?

11 A. If you are saying that whether I
12 believe that the same results would occur elsewhere,
13 no, I wouldn't necessarily agree with that.

14 Q. Now, you referred me to a page 101
15 which as happenstance I was going to refer you to.

16 The third paragraph, the second sentence,
17 they note -- or Bormann notes:

18 "The quantitative aspects of the models
19 when applied to a commercial clearcut
20 would vary in relation to the rapidity
21 with which active and passive plant
22 processes were restored after cutting."

23 In layman's terms, Ms. Krishka, is
24 Bormann saying that the longer you keep the vegetation
25 down with herbicides the greater the negative effects?

1 Is that one way of understanding that sentence?

2 A. You have to take into consideration
3 that you are talking about what proportion of the
4 vegetation you will be keeping down with herbicides in
5 that case.

6 Q. As a general principle, is that an
7 accurate way to interpret that sentence, in your
8 opinion? Would you like me to read the question again?

9 A. No, I think that I would agree
10 because it says to the rapidity with which active and
11 passive plant processes were restored after cutting,
12 and you have to consider all the plant processes and
13 all the vegetation therefore.

14 Q. So the longer you keep the vegetation
15 down with herbicides, the greater the negative effects;
16 is that accurate generally speak?

17 A. It would be more accurate if you also
18 said -- if you said that you were meaning all
19 vegetation on the site.

20 Q. Sorry, I missed the last...

21 A. If you went one step further in your
22 statement and included all vegetation on the site, then
23 I could agree with that.

24 Q. All right. So the longer you keep
25 all the vegetation down with herbicides the greater the

1 negative effects?

2 A. That's correct.

3 Q. Now, at pages - we are still with
4 Exhibit 674 - at pages 98 to 100 of this exhibit, under
5 the heading: Overall Effects of Enforced Devegetation
6 on Ecosystem Dynamics.

7 What I understand - and perhaps you can
8 confirm this for me - that Bormann is doing on those
9 pages is he is setting out the conclusions with respect
10 to the effects of enforced devegetation on eco-system
11 dynamics, is that right, and he has five of them; is
12 that correct?

13 A. Would you repeat that question,
14 please?

15 Q. That what Bormann is doing on pages
16 98 to 100 are setting out the conclusions?

17 A. Yes, basically that's what he is
18 doing.

19 Q. And I would like to go through them
20 with you, but I don't wish to dwell at length about the
21 particular results he got there. I just want to deal
22 with the general findings and determine whether you
23 agree that, generally speaking, such findings might be
24 applicable elsewhere than simply in New Hampshire?

25 A. I could only -- if you were talking

1 about if they were applicable under the exact same
2 circumstances, I think I could tell you whether I
3 agree, but if you are saying if I agree they are
4 applicable elsewhere, there is a multitude of
5 situations that could occur and that would have an
6 effect on what the results would be.

7 I'm not sure how useful that would be.

8 Q. Let's just go through, in summary
9 form, to determine whether there is some common ground
10 between us.

11 The first thing that Bormann outlines is
12 storm peak flows were accentuated and there was an
13 increase in annual streamflow. Generally speaking,
14 would you expect that to be applicable elsewhere as a
15 potential problem?

16 A. This study was done under very
17 extreme conditions. There was a 29 per cent slope, it
18 was a sandy coarse soil overlying bedrock and the area
19 was kept completely denuded, so I have some trouble
20 with trying to extrapolate these results to another
21 situation.

22 Q. So is it your testimony that -- let's
23 go through all five of them and if your answer is the
24 same to all five, then that's fine.

25 The second item he notes is that

1 concentrations of dissolved nutrients in stream water
2 increased. Is your answer the same to that? Would we
3 expect that elsewhere?

4 A. What's your question?

5 Q. Would you expect to find that
6 elsewhere?

7 A. I would have to give you the same
8 answer.

9 MR. FREIDIN: Mr. Chairman, I think Dr.
10 Allin testified about this particular report and
11 answered a number of questions in cross-examination in
12 Panel 10 and 11.

13 THE CHAIRMAN: Well, I think, without
14 getting into Dr. Allin's testimony, if this witness'
15 response is going to be: My answer would be dependent
16 on the specific fact situations as to whether or not
17 you would agree whether extrapolation is or is not
18 appropriate, I don't see that it serves really any
19 purpose to go through them one by one.

20 I take it that is your answer for these
21 five conclusions?

22 MS. KRISHKA: Yes, it is.

23 MR. CASTRILLI: All right, that's fine.

24 Q. Would you agree that in order for a
25 decision-maker to know whether to accept -- well,

1 actually, your answer to that -- to this area leaves me
2 wondering what your position is on the matter. Is it
3 best stated at page 342 at the bottom, that last
4 paragraph, your overall conclusion?

5 MS. KRISHKA: A. Yes, I would say that's
6 basically my position and my opinion.

7 Q. What is that based on, any particular
8 studies done in Ontario?

9 A. Well, you actually provided an
10 example of a situation where you could follow those
11 conclusions.

12 In Hornbeck's paper they also came up
13 with a list of conclusions and their conclusions
14 outlined that their results were -- although follow the
15 same basic principles, the magnitude was much smaller
16 than what had occurred in Watershed 2 at Hubbard Brook.

17 And so in that sense, yes, at Hubbard
18 Brook there is an actual study that was done that
19 showed that in fact vegetation on the site does
20 mitigate some of those potential impacts that can occur
21 from removing vegetation from the site.

22 Q. The question I asked was: Are there
23 comparable studies to Hubbard Brook in Ontario. And
24 let me be even clearer about the question. Did you do,
25 or has MNR done such studies for this hearing?

1 A. No, MNR has not done studies for this
2 hearing. Whether -- the answer to your first question,
3 I am not familiar with a study that has been done in
4 Hubbard Brook specific -- or in Ontario that is
5 specifically the same as Hubbard Brook, but there are
6 extensive studies done in Ontario and I provided you
7 with a list of some of the studies in answer to one of
8 your interrogatories.

9 Q. That's all you have provided to this
10 hearing is a list of documents; is that right? There
11 is nothing in your evidence and there was nothing in
12 first instance in your evidence that speaks to this
13 issue; is that right?

14 You preferred to rely on derivative work
15 in the form of Hornbeck or else reviews of Hubbard
16 Brook and Bormann studies and not work done here; is
17 that right?

18 A. Well, I'm not sure that I would say
19 derivative work. You can understand it -- you are
20 relying on this somewhat just as we are relying on this
21 data somewhat, so we do have to rely a fair bit on the
22 state-of-the-art in the literature that's available
23 from the researchers whose expertise is in that area.

24 So, yes, we are relying a fair bit on the
25 state-of-the-art literature that's available and we did

1 not undertake studies of our own.

2 Q. But there are certain parts of
3 Bormann's work that you like and I presume there are
4 certain parts you don't; and it is the parts -- some
5 parts you have concluded here, and that's where we get
6 this last paragraph?

7 THE CHAIRMAN: Well, surely, Mr.
8 Castrilli, that's not different from the use of any
9 study by parties on opposite sides of the spectrum.

10 It would be rare indeed if every party to
11 a hearing or to an issue reached or relied upon the
12 same portions of every study.

13 MR. FREIDIN: Mr. Chairman, if I might,
14 there was evidence again that we rely on in Panel 10 and
15 11, evidence of Dr. Allin in relation to two studies in
16 Ontario - one by Schindler, one by Nicholson - which
17 dealt with the effects of the vegetation removal on the
18 aquatic environment, in particular, what effect it had
19 on the increase in nitrates and phosphorous.

20 MR. CASTRILLI: Q. That's there, but not
21 here; is that right?

22 MS. KRISHKA: A. I didn't refer --

23 Q. It's not referred to in your
24 material; is it?

25 THE CHAIRMAN: Well, hold it, Mr.

1 Castrilli. When you say it is there but not here,
2 surely when there is an overlap in areas of the
3 evidence such as, what may happen to the nutrient cycle
4 as a result of any number of things, whether it be
5 harvest, use of herbicides or something else, it
6 doesn't have to be repeated in every segment of the
7 case.

8 I mean, we are looking at the evidence
9 overall. We are considering everything that is brought
10 into evidence during the course of this hearing and if
11 there are parts that overlap, so be it.

12 But if there are parts that are given in
13 one area that can be applied to another area, so be it
14 as well.

15 MR. CASTRILLI: Mr. Chairman, I don't
16 have any difficulty with that. Ms. Krishka or whatever
17 produced this -- or whoever authored this paper chose
18 to rely on three or more studies that I have been
19 attempting to obtain answers from Ms. Krishka about.

20 So these are the ones that Ms. Krishka is
21 is in a position to speak to, I guess, to the extent
22 she can speak to them at all, and I think it is
23 entirely reasonable for me to ask whether in fact her
24 conclusions with respect to these three studies in
25 particular, or books as the case may be, are in fact

1 what the authors said. That's all I am doing.

2 THE CHAIRMAN: Well, you can ask her what
3 she considered in her opinion the authors to have said.
4 Once again we won't know exactly what was meant unless
5 we call the authors themselves.

6 . And there has to be some limit to whom we
7 call before this hearing in terms of the number of
8 studies that have been presented throughout the course
9 of the hearing,

10 MR. CASTRILLI: I am not advocating
11 calling them, I am just noting where references are
12 made to their conclusions or, in particular, the
13 extrapolation that Ms. Krishka makes at the bottom of
14 the page 342 in relation, for example, to the Hornbeck
15 report and earlier to Bormann and Likens, whether in
16 fact that's what those reports say.

17 MR. FREIDIN: Mr. Chairman, if Mr.
18 Castrilli is not intending on calling them, maybe he
19 should take the witness' answer at face value. And on
20 what basis does he suggest to the witness that the
21 witness doesn't understand the article.

22 I mean, are we now comparing Mr.
23 Castrilli's evidence against Ms. Krishka's evidence?

24 MR. CASTRILLI: Mr. Chairman, the
25 material speaks for itself.

1 THE CHAIRMAN: Well, the material may
2 speak for itself, but certainly the material can be
3 interpreted in various ways by various people given
4 their level of experience.

5 MR. FREIDIN: I take the forester over
6 mister lawyer.

7 THE CHAIRMAN: That's a rare admission,
8 Mr. Freidin.

9 MS. CRONK: We have to take a vote on
10 that.

11 MR. CASTRILLI: Do you want to think
12 about that one?

13 MR. MARTEL: I like that.

14 THE CHAIRMAN: Don't like it too much.

15 MR. CASTRILLI: Can I continue?

16 THE CHAIRMAN: Yes.

17 MR. CASTRILLI: Q. Ms. Krishka would you
18 agree that a non-commercial tree species should be
19 protected?

20 MS. KRISHKA: A. Well, I guess it would
21 depend on what species and under what circumstances. I
22 wouldn't say categorically you would not.

23 Q. Page 226 of Exhibit 674.

24 THE CHAIRMAN: 276?

25 MR. CASTRILLI: Sorry, 226.

1 Q. Item 7 on page 226.

2 MS. KRISHKA: A. Yes?

3 Q. Bormann and Likens note that:

4 "Proper ecological weight should be given
5 to species such as..."

6 And they named four:

7 "...pin cherry, raspberry, elderberry
8 which have little importance as a source
9 of wood products. These exploitive
10 species may play an important role in the
11 recovery process by conserving nutrients
12 and minimizing erosion and also are an
13 important source of food for wildlife."

14 Leaving aside whether pin cherry,
15 raspberry and elderberry are in the boreal forest in
16 Ontario, would you agree generally with the proposition
17 that Bormann sets out there?

18 A. Yes, I would.

19 Q. Thank you.

20 A. That would be a concern if you were
21 going to attempt to completely suppress and eliminate
22 all vegetation on the site for a long period of time as
23 they did in Hubbard Brook.

24 Q. Okay. Then coming back to Hubbard
25 Brook, would you agree that the essential element of

1 the work in relation to that watershed is that
2 clearcutting and herbicide use does cause nutrient
3 losses, erosion and increased water yield

4 A. Could you repeat your question,
5 please?

6 Q. The essential conclusions of the
7 Hubbard Brook work are that clearcutting and herbicide
8 use does cause nutrient losses, erosion and increased
9 water yield?

10 A. I would agree with you with that
11 statement, but I would like to qualify that in that the
12 order of the magnitude is an important consideration
13 there.

14 I don't have any problems with the
15 conclusions they came up with in the Hubbard Brook
16 study and that those principles would apply.

17 So you would have to take that into
18 consideration, but they also state, I believe Kimmins
19 stated, the mitigative factors of revegetation are very
20 important in minimizing those kinds of impacts.

21 THE CHAIRMAN: Ms. Krishka, is it your
22 view that what happened, from what we understand on the
23 Watershed 2 experiments, you mentioned a couple of
24 times that that was an extreme case, and I take it by
25 that, do you mean that in normal forestry practices it

1 is not usual (a) to suppress growth in that way such as
2 practically sterilizing the soil and denuding the
3 forest floor almost completely of all growth and for
4 that kind of sustained period of time?

5 MS. KRISHKA: Oh absolutely. In fact, it
6 is counter to what our objectives are, because we want
7 to regenerate the site.

8 THE CHAIRMAN: And so, therefore,
9 although - I just want to make sure that I understand
10 this correctly - although you don't quarrel with the
11 conclusions reached in the Hubbard Brook study, if that
12 type of practice was carried out you would have
13 difficulty in extrapolating those results to other
14 situations where those kind of normal forestry
15 practices are not carried out?

16 MS. KRISHKA: I think you lost me
17 somewhere. You said when...?

18 THE CHAIRMAN: I am saying you don't
19 quarrel with the results of the Hubbard Brook study in
20 that case where those particular practices were carried
21 out?

22 MS. KRISHKA: That's correct.

23 THE CHAIRMAN: Such as sustained
24 suppression, sterilization of the soil, et cetera?

25 MS. KRISHKA: Yes.

1 THE CHAIRMAN: But that you would have
2 difficulty in extrapolating those results to any other
3 area where such practices were not carried out?

4 MS. KRISHKA: Yes, that's right.

5 THE CHAIRMAN: Is that basically your
6 position? Okay.

7 MR. CASTRILLI: Q. And is it fair to say
8 that the more severe the clearcutting and subsequent
9 herbicide treatments, the more detrimental the effects?
10 Is that a fair proposition arising from all of this?

11 MS. KRISHKA: A. Well, I suppose as you
12 approach the situation that was done at Hubbard Brook,
13 the closer you got to that, the more severe your result
14 would be.

15 Q. So the answer is yes, generally?

16 A. Generally.

17 Q. And would you agree and confirm that
18 the length of the effect will depend on how soon the
19 area is regenerated or revegetated?

20 A. Yes.

21 Q. And would it be fair to say that
22 herbicide treatments to reduce the amount of vegetation
23 during the critical years of reforestation, which I
24 presume are the early ones, can only be detrimental
25 with respect to some of the losses we were talking

1 about earlier?

2 MS. MURPHY: Sorry, I missed that one.

3 MR. CASTRILLI: Q. Would you agree that
4 the herbicide treatments -- that herbicide treatments
5 to reduce the amount of vegetation during the early
6 years of reforestation can only be detrimental with
7 respect to such losses and the losses I'm speaking of,
8 the ones we have been talking about, nutrient loss,
9 erosion and increased water yield?

10 A. Can only be detrimental in relation
11 to what? I guess I'm --

12 Q. In relation to increasing nutrient
13 loss, increasing erosion and increasing water yield.
14 Is there anything positive associated with herbicide
15 use in relation to those three things?

16 A. Well, there are positive things, yes,
17 there are.

18 Q. Do you apply herbicides for those
19 purposes?

20 A. No.

21 Q. If you get those results, is that
22 positive or negative?

23 A. Which results are you speaking of?

24 Q. Nutrient loss, increased erosion,
25 increased water yield.

1 THE CHAIRMAN: But aren't there more than
2 than those three effects that are a result of applying
3 herbicides in any fashion? I mean, are you just trying
4 for some impact on those three items, or are you
5 looking --

6 MR. CASTRILLI: I'm just giving three as
7 an example.

8 THE CHAIRMAN: Well, those are three, but
9 isn't the ultimate purpose regrowth, regeneration.

10 MR. CASTRILLI: Of trees perhaps, but I'm
11 talking about what can we expect in terms of the impact
12 on those three factors; nutrient loss, erosion and
13 increased water yield.

14 MS. KRISHKA: I think, if I'm permitted
15 to, I think that Mr. Armson when he gave evidence in
16 Panel 9, I have a section of the transcript where he
17 was asked a similar question by Ms. Swenarchuk and his
18 answer is - I would concur with his answer - he was
19 asked:

20 "Yes, they referred to possible..."

21 I'm sorry, the question was:

22 "Would you agree that suppressing the
23 competing vegetation asby the use of
24 herbicides, for example, after logging by
25 retarding new vegetation could contribute

1 to further nutrient loss?"

2 And he said:

3 "It might and it might not."

4 And later he said:

5 "Where the revegetation is limited in
6 some way then that can, not necessarily,
7 can in fact increase the amount that
8 could be lost particularly by leaching
9 rather than by erosion."

10 So my answer to your question is that it
11 may.

12 MR. CASTRILLI. Q. That's fine. Can you
13 confirm for me, Ms. Krishka and/or perhaps Mr.
14 Campbell, that when a broadcast application of - I will
15 call it Velpar because I can't say the other one well
16 enough to justify saying it in public - is made,
17 extensive regrowth of highly competitive target species
18 such as grass and raspberries will not occur until the
19 second or third season after application?

20 DR. CAMPBELL: A. You definitely get
21 some before that. You don't get -- certainly don't get
22 complete regrowth before the second or third season.

23 Q. And that is essentially your
24 evidence, Mr. Campbell, isn't it at pages 215 and 216
25 of Exhibit 603A?

1 A. I will check. Pages what?

2 Q. 215 and 216.

3 MR. FREIDIN: Mr. Chairman, perhaps for
4 the record Dr. Campbell could indicate what Velpar is.
5 There seems to be a number of chemicals that some
6 people have trouble pronouncing.

7 MS. CRONK: Well, I don't think that
8 is...

9 DR. CAMPBELL: Velpar is the trade or
10 product name, the active ingredient is hexazinone.

11 The one thing to point out, of course,
12 about a broadcast application of hexazinone is that
13 although it will control or suppress herbaceous
14 vegetation, it has relatively little effect on any
15 woody vegetation which is on the site and usually there
16 is a considerable amount of that at any given time.

17 MR. CASTRILLI: Q. So, Dr. Campbell, the
18 answer to my question is yes?

19 DR. CAMPBELL: A. You will have to go
20 back to the question again, please.

21 Q. When a broadcast application of
22 Velpar is made, extensive regrowth of highly
23 competitive target species such as grass and
24 raspberries will not occur until the second or third
25 season after application. I believe your answer

1 was...?

2 A. Significant regrowth of those species
3 will not occur until then, but other species it will.

4 Q. And the other species are...?

5 A. The woody species.

6 MS. KRISHKA: A. Species such as aspen.

7 Q. Also known as poplar?

8 A. Yes.

9 Q. So that the application of that
10 herbicide can -- excuse me, not the application but the
11 effects of that herbicide treatment on control of
12 vegetation can be felt for two to three years; is that
13 right?

14 DR. CAMPBELL: A. Could you repeat that,
15 I'm sorry, my hearing is not that great.

16 Q. Neither is mine actually, this is may
17 be difficult. Would you agree that generally the
18 effects of herbicide or herbicide treatment on control
19 of vegetation can be felt for two to three years after
20 application.

21 A. It is true that an effect will be
22 felt, nevertheless you are going to have vegetation
23 regrowing within one year after the application.

24 Q. Sorry, what will you have growing
25 after one year?

1 A. Well, one of the most common species
2 that you will see on a site which has been treated with
3 hexazinone and is a herbaceous species as well is
4 touch-me-not. You may have a large amount of this will
5 grow within one growing season after an application.
6 It appears that this species is relatively tolerant of
7 hexazinone.

8 THE CHAIRMAN: What is it, is it a
9 herbaceous type of plant?

10 DR. CAMPBELL: Well, I guess you are not
11 familiar with it. Jewelweed, touch-me-not.

12 MS. KRISHKA: They are impatiens, they
13 are real common house plants.

14 THE CHAIRMAN: I just planted six flats
15 of them on the weekend.

16 MR. CASTRILLI: Q. What size are we
17 talking about? What size plant are we talking about
18 after one year in terms of root system?

19 DR. CAMPBELL: A. I couldn't speak in
20 terms of the root system. I mean, the root system of
21 the individual plant is perhaps not as relevant as the
22 number of individuals that are on the site and we have
23 not quantified it to that extent.

24 But, nevertheless, you can go on one of
25 these sites and what you will find is what appears to

1 be in effect a continuous canopy of this particular
2 vegetation.

3 Q. Would you agree - I think this is
4 still properly directed to you, Dr. Campbell - that the
5 rate of regrowth of, I will call it herbaceous
6 vegetation, is particularly important following
7 herbicide application because nutrient loss may
8 increase during the winter and spring in areas where
9 regrowth of vegetation was sparse?

10 A. Run that by again, please?

11 Q. Sure. Would you confirm that the
12 rate of regrowth of herbaceous vegetation is
13 particularly important following herbicide application
14 because nutrient loss may increase during the following
15 winter and spring in areas where regrowth of vegetation
16 was sparse -- is or was sparse?

17 A. I'm not quite sure what the relevance
18 of the winter and spring is, unless I have missed the
19 question somehow.

20 Q. Pages 349 and 350 of Exhibit 603B.
21 It is the bottom of page 349.

22 A. 349.

23 Q. And the top of page 350.

24 MS. KRISHKA: A. I think the reference
25 there to winter and spring was some concern with

1 regards to the end of a season where there was snow and
2 rain and there would be some increase in leaching or
3 movement of soil due to the increasing water in the
4 soil.

5 Q. Dr. Campbell, are you the right
6 person for me to be directing this question to?

7 DR. CAMPBELL: A. This is not a part
8 that I was directly familiar with so...

9 Q. Ms. Krishka, are you the one I should
10 be directing the question to?

11 MS. KRISHKA: A. Yes, you are -- I am.

12 Q. Do you agree with the paragraph?

13 A. Yes, I do.

14 MR. CASTRILLI: Mr. Chairman, I don't
15 believe you indicated when you wanted to rise today.
16 Could I have some indication so I know where to stop?

17 THE CHAIRMAN: How are you making out
18 this afternoon in terms of your examination?

19 MR. CASTRILLI: I would think we are
20 definitely going to finish by mid-day tomorrow or
21 thereabouts.

22 THE CHAIRMAN: And then are you going to
23 be the rest of the afternoon?

24 Ms. Seaborn?

25 MS. SEABORN: I'm not sure, Mr. Chairman,

1 if I will take the whole afternoon if we start after
2 the lunch break, probably a couple of hours, though.

3 THE CHAIRMAN: And re-examination would
4 be how long, Mr. Freidin, or Ms. Murphy?

5 MR. FREIDIN: Two to three hours.

6 Probably closer to the two. I think we want to start
7 on Wednesday morning with that.

8 THE CHAIRMAN: So it is likely that we
9 would be concluding this panel by Wednesday noon; would
10 that be correct?

11 Sorry?

12 MS. BAIR-MUIRHEAD: Excuse me, Mr.
13 Chairman.

14 THE CHAIRMAN: Yes.

15 MS. BAIR-MUIRHEAD: I have some questions
16 on behalf of Grand Council Treaty No. 3 which will take
17 less than two hours.

18 THE CHAIRMAN: Less than two hours.

19 Well, I would suggest that even if we
20 started tomorrow at nine o'clock and perhaps on
21 Wednesday at 8:30 we should be able to complete, would
22 you say that was reasonable, Mr. Freidin?

23 MR. FREIDIN: It sounds to me like we
24 should be able to totally finish on Wednesday. We
25 better be able to.

1 THE CHAIRMAN: Okay. Well, we can
2 adjourn at any time that is convenient to you, Mr.
3 Castrilli.

4 MR. CASTRILLI: We are at a point in my
5 cross-examination where this will be as convenient as
6 any.

7 THE CHAIRMAN: Okay.

8 MR. CHURCHER: Before we do, Mr.
9 Chairman, before the break, I undertook a couple of
10 undertakings and I wonder if this would be an
11 appropriate time to clear it up?

12 THE CHAIRMAN: Very well.

13 MR. CHURCHER: First of all, Mr.
14 Castrilli, you asked me to verify that a calculation
15 that you had done 3-million hectares -- or 3-million
16 cubic metres divided by 2-billion cubic metres as being
17 .15 per cent and that is correct.

18 And the second undertaking was to
19 determine the total area of commercially operable
20 forest treated in the northcentral region in the 1987
21 spruce budworm program and I have determined that that
22 area is approximately 52,800 hectares. 52,800.

23 MR. CASTRILLI: Q. Sorry. So that is
24 what you would anticipate cutting within the next 10
25 years; is that right?

1 MR. CHURCHER: A. That is correct.

2 MR. CASTRILLI: Thank you. We can take
3 this up tomorrow morning.

4 Mr. Chairman, there is one interrogatory
5 that I failed to include in my original package. I can
6 either file it now or file it tomorrow. I'm in your
7 hands.

8 THE CHAIRMAN: Okay. You might as well
9 file it now.

10 MR. CASTRILLI: It's another Forests for
11 Tomorrow interrogatory for Panel 13 and it's question
12 No. 18.

13 THE CHAIRMAN: Okay. That will be
14 Exhibit No. 675.

15 THE CHAIRMAN: That was Question No. 18,
16 did you say?

17 MR. CASTRILLI: Yes, that's correct.
18 (handed)

19 THE CHAIRMAN: Thank you.

20 ---EXHIBIT NO. 675: Forests for Tomorrow Interrogatory
21 Question No. 18 (Panel 13).

22 THE CHAIRMAN: Very well. We will
23 adjourn until 9:00 a.m. tomorrow. Thank you.

24 ---Whereupon the hearing adjourned at 5:00 p.m., to be
25 reconvened on Tuesday, June 20th, 1989, commencing
at 9:00 a.m.

